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## Wake Up: Packet Nets Now a Reality

By Ronald A. Frank  
CW Staff

ANN ARBOR, Mich. — Emerging network architectures like IBM's Systems Network Architecture (SNA) and Digital Equipment Corp.'s Decnet can ultimately coexist with public packet networks in the same user systems if vendors make the required interfaces compatible within their equipment, according to Dr. Dixon Doll, a communications consultant here.

DP equipment vendors do not yet believe the public packet nets are real and have done little to meet the users' needs in this area, Doll said in a recent interview.

The recent implementation of an SNA interface by IBM World Trade for the Datapac network in Canada and the Transpac network in France points up the unnecessarily complicated manner in which the vendors are ap-

proaching packet problems, Doll said.

The IBM Network Interface Adapter (NIA) in the SNA implementations generates a polling routine to make a Model 3270 CRT think it is talking to a 3705 front end when in actuality it is being interfaced with the network.

CW Special Report on Data Communications Networks follows Page 48.

The NIA takes information from the terminal and translates this into the Higher Level Data Link Control (HDLC) protocol for transmission over the packet network. At the other end of the network, a 3705 attached to a 370 or other IBM mainframe contains a software ex-

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# COMPUTERWORLD

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New Standard of Professionalism?

## Judge Rules DPers Open to Malpractice Claims

By Ann Dooley  
CW Staff

NEW YORK — Computer specialists and their clients have a "special relationship" which may make the DPers liable for their actions even years after a contract has ended, a federal court judge ruled here recently.

District Court Judge Constance Baker Motley held that DP professional liability is comparable to that of an architect or an accountant and subject to malpractice claims by a client.

The ruling came during a pretrial hearing of the F&M Schaefer Brewing Co. suit against Electronic Data Systems Corp. (EDS) which claims EDS did not fulfill its contract to supply Schaefer with DP services under a

facilities management contract.

The decision may set a new standard of professionalism for the DP community, some observers said last week.

Since DP uses a special language, a client cannot give informed consent to DPers' work, Motley indicated. Even

when a client approves a system, therefore, it may have done so without full understanding, she said.

The client must rely on the advice and knowledge of the DP expert, and this is the basis of the special relationship between the two, the judge explained.

Because of this relationship, any fraud or negligence which occurs might not be discovered until the continuing treatment had ended, she added.

While the statute of limitations would normally prohibit any legal action after a certain number of years dating from

the beginning of the contract, the statute of limitations for a client under continuing treatment would begin only after the relationship had ended, she noted.

The Schaefer defense will probably now move from a claim of contract fraud to what the professional duties of a system designer include, sources close to the case said. In proving a special relationship, Schaefer will have to show it had no knowledge of what EDS was doing with the system it was running for the brewer.

EDS, on the other hand, is contending that Schaefer employed DP experts and that the two companies were engaged in a business relationship and not a profes-

(Continued on Page 3)

### Concern Reaches White House

## Fears of FBI Switch Plan Grow

By Edith Holmes  
CW Staff

WASHINGTON, D.C. — Both the White House and the Office of Technology Assessment have been asked to review the Federal Bureau of Investigation's plan to switch criminal histories between the

states and federal users through the National Crime Information Center (NCIC) here.

"Creation of a national police force and a national data bank are what is at issue here," Rep. John E. Moss (D-Calif.) said in a letter to the President's Office of Science and Technology Policy.

The message-switching proposal, devised by the Justice Department and the FBI, may be chosen for study by the Domestic Presidential Review Memoranda, a White House mechanism created by the Carter Administration to examine important policy issues. The White House is still considering the matter.

At the request of two congressmen on the House Judiciary Committee, Chairman Peter W. Rodino Jr. (D-N.J.) and Don Edwards (D-Calif.), Congress' Office of Technology Assessment (OTA) will also look into the plan during a complete eval-

uation of NCIC.

OTA has already established an informal working group of outside experts and inside staff to study NCIC. The group held its first meeting at the beginning of November, a spokesman said.

(Continued on Page 6)

## IBM Offers Graphics Unit Manufactured by Sanders

By Ronald A. Frank  
CW Staff

WHITE PLAINS, N.Y. — IBM will sell, support and maintain a complete terminal system manufactured by Sanders Associates, Inc. as a direct result of the antitrust settlement the two firms reached last January.

IBM's announcement of the Model 3250 graphics display system is believed to mark the first time the mainframe has introduced a complete terminal system produced by

another vendor.

The 3250 can reportedly connect and display any series of 1,024 addressable points on a CRT screen at the rate of 350K in./sec. It is an upgrade for the IBM 2250 Model 3 and was designed primarily for use by engineers and draftsmen in graphics design environments.

Designed by Sanders "under the direction of IBM's Systems Communications Division in Hursley, England," the 3250 is the first product to

(Continued on Page 6)

## Bundled Pricing Illegal, 1968 IBM Memo Admits

By Catherine Arnst  
CW Staff

NEW YORK — IBM officials apparently recognized as early as 1968 that tying in software and services with the price of a CPU was illegal under U.S. antitrust law although the announcement to unbundle was not made until June 23, 1969.

IBM memoranda supporting this charge were entered into the U.S. vs. IBM antitrust trial records here recently in spite of IBM efforts to keep them

out of the public eye.

These documents, which describe the alternatives and strategies the firm considered in attempting to rectify the tie-in situation before it was forced to do so by legal action are part of a group of documents on which IBM claimed attorney-client privilege in an attempt to keep them out of the government's hands [CW, Nov. 7]. These claims were all ultimately overruled by the trial judge.

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## Doll to Vendors: Packet Networks Now a Reality

(Continued from Page 1)

tension to the Network Control Program (NCP) to implement X.25 Level 2 and Level 3 protocol functions, Doll explained.

Polling operations normally generated at the 3705 are moved out to the NIA at the terminal because polling is not a viable procedure through a packet net, he said. Polling messages would look like data messages and the delay would be unpredictable; in addition, the user would be paying for each poll and control message, he added.

### User Pays for Everything

Under presently announced capabilities, the packet net user with an SNA system who decides not to use a private line network has to pay for all the IBM teleprocessing functions including the Virtual Telecommunications Access Method (Vtam), NCP, the 3705 software extension and the NIA. All these costs are based on the vendor's decision to duplicate many of the packet network control functions, Doll said.

The real channels to which the packet net user is connected are very intelligent logical facilities. The vendor would never require the user to pay for such a cumbersome network capability if the vendor acknowledged the provision of intelligent network control functions by the packet carrier, he said.

IBM is actually trying to make minimal changes to the basic private line approaches of SNA, resulting in a minimal need to change any hardware or software already in place, according to Doll. The results of this methodology are high costs, less efficiency and more duplicated functions than if the vendor were to design for the packet capability from the start, he contended.

As evidence of a more streamlined vendor approach, Doll called attention to the Raytheon packet implementation which incorporates NIA-type

## IBM Hikes Rental, Lease Fees

ATLANTA — IBM has increased the rental and lease prices for such equipment as the System 32, System 7 and some models of the System 3 line by approximately 5%.

Also included in the price increases are I/O gear for the systems, unit record equipment and most program licenses, the firm's General Systems Division said.

The System 3 models affected include the 4, 6 and 10. Rental and lease rates for the models 3741 and 3742 data entry devices are also up, as is the rental rate for the 029

keypunch.

For example, the System 32-A1 rental was \$748/mo and has been increased to \$785/mo; the top-of-the-line System 32-C44 was increased from \$1,483/mo to \$1,557/mo, the firm said.

The 3/10-42 was \$393/mo and has gone to \$411/mo, with the 3/10-A17 rising from \$1,770 to \$1,854.

The company said the price increases reflect "a normal business review."

functions and normal 3270-type terminal capabilities combined into one controller.

### Key Question

The key question in this situation, Doll pointed out, is who will provide the intelligence necessary to interface terminal equipment and mainframes to the public packet nets. If the vendors do not, then it will be left to the carriers to do so.

Short-term attempts to interface existing data communications systems to the packet nets using the IBM methodology will be "totally unworkable over the long term," Doll said.

One of the factors holding back major commitments by the vendors is that portions of the proposed X.25 standard are still not finalized. Some of these issues will have to be resolved before the vendors make major decisions, he said.

IBM recognizes there are certain inadequacies with its present approach, but until the structure of the marketplace and the interface standards become more crystallized, it is reluctant to make major changes in its main SNA products like NCP and Vtam, he added.

If IBM understood that users are not going to accept the packet/SNA interfacing approach announced thus far, it would come up with a more efficient packet net interface with less software and less complex NCP and Vtam func-

tions. Rather than duplicating many of the functions now provided by the carriers, a more efficient interface would include only those capabilities not handled by the carriers, he said.

Until the U.S. packet carriers like Tymnet and Telenet become a major factor, however, IBM will not provide network interfacing for domestic users, Doll believes. IBM is also carefully watching to see what capabilities AT&T will provide with its Bell Data Network (BDN), he said.

If BDN does not provide compatible interfacing with X.25 networks, somebody else will have to develop this capability, Doll predicted.

## Catamore Case Gets Trial Date

PROVIDENCE, R.I. — Judge Francis Boyle has set March 3 as the date for commencing the second round of the trial involving Catamore Enterprises, Inc. and IBM.

The new trial was ordered by the U.S. Court of Appeals in Boston on the grounds the jury was erroneously allowed to find written and oral contracts valid at the same time [CW, Oct. 4, 1976]. The appeals court also cited a statute of limitations.

The original jury judgment ordered IBM to pay Catamore \$11.4 million and Catamore to reimburse IBM \$68,453.

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## Technique Applicable to Disks

# Phone Company Salvages Tape's Erased Data

By Brad Schultz  
CW Staff

STOUGHTON, Mass. — Information accidentally erased from magnetic tape was successfully recovered by a Western U.S. telephone company, using a method created here by a small instrumentation firm.

First developed about five years ago for use with analog tape, the method was applied this year to the phone company's digital tape containing toll call records.

When interviewed, the phone company spokesman requested that his company's name be withheld as a matter of policy, not wanting to appear as especially endorsing the method's proprietor.

The method employs very low noise amplifiers and special playback techniques and is based on evidence that recorded magnetic tapes usually retain some residual signal level — even after intensive erasure, according to its developer, Wesley Tannenbaum of Sysco Engineering Corp.

Sysco has been able to recover data from erased tape at sufficient signal-to-noise levels to enable a successful readout of the data, Tannenbaum ex-

plained.

"The process then is to re-record the low level 'readout data' on another tape so that the user can play back the data on an ordinary tape machine or a computer playback tape machine as the case might be," he said — noting, however, that data usually cannot be recovered if a new similar type of recording has been made over the erased data.

Tannenbaum described the method as perfected and reliable and said it is applicable to recordings on other magnetic media, such as disks.

Sysco Engineering Corp. is a small producer of customer instrumentation systems, founded in 1965 by Tannen-

baum, who is president. The firm has five employees and annual sales that fluctuate from zero to \$100,000, according to Tannenbaum.

Prior to his telephone company contract, Tannenbaum had emphasized the method's capability for enhancing weakly recorded tape, rather than recovery of erased information.

### Only Alternative

The telephone company approached a number of firms — including some well-known electronics and communications companies — before locating Sysco, the spokesman explained, but no one else seemed to be able to recover the data from the company's ac-

cidentally erased tapes. The small, relatively unknown Sysco was found to be the only alternative.

The spokesman seemed satisfied with Sysco's service, despite his reluctance to be identified.

Tannenbaum said he knows of no place else in the U.S. having this recovery capability.

The cost of the service depends upon the extent of the erasure, the quantity of tape involved and the specialization of the equipment needed to run the tape. Tannenbaum explained. For example, he said, the price for recovering erased information on one reel of 1/2-in. computer tape would probably be about \$2,000.

## DPers Liable For Malpractice

(Continued on Page 1)  
sional one.

Schaefer originally brought suit charging EDS with designing a faulty computer system [CW, Sept. 13, 1976] and has now added malpractice claims to its charges. It also claims the statute of limitations for such suit has not expired because of the "professional" nature of their relationship.

EDS is claiming that malpractice does not apply because the statute of limitations has expired.

Since data processing is a complex field that the ordinary person does not understand, DP people will have to exercise a certain standard of care when dealing with non-DPers, Schaefer attorney Thomas Christo told the court.

In the future, DPers may have to be careful of offering advice, even under the Good Samaritan rule of helping out a neighbor with his system, one DP expert later said, since it's possible the DPer could be held liable for such advice.

Although the judge inferred that a special relationship is possible in data processing, she has not taken the position that this is true in the Schaefer case and will wait for the trial to make that decision.

In order to give both parties time to prepare for the new developments, the trial was postponed until April 10.

## Adapso Sets Tax Meet

NEW YORK — An opportunity to discuss the recent decisions of the New York State Tax Commission [CW, Nov. 21] and their implications for the data processing community will be offered Dec. 5 at 1:30 p.m. at the New York Hilton here.

More information is available from Adapso at 210 Summit Ave., Montvale, N.J. 07645.

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# Software Protection 'Insignificant'

By Brad Schultz  
CW Staff

CAMBRIDGE, Mass. — The typical software company is not especially concerned with protecting its software, and — to the extent that it is — would rather rely on physical, technological and contractual protection than on legal controls, a report by Harbridge House, Inc. of Boston has concluded.

Prepared under a contract with the National Commission on New Technological Uses of Copyrighted Works (Contu), the report said the typical company "may — just 'may'" take advantage of offered legal protection, but would not be deterred from developing or marketing new programs in the absence of protection.

Although this is likely to change as the typical company grows, the issue of legal protection of software through a grant of limited monopoly is, for the most part, of "monumental insignificance to the industry," the report said.

In seeking its data, Harbridge House mailed questionnaires to software industry executives and also relied on a questionnaire published in the July 11 issue of *Computerworld*.

The volume of responses to the survey completed with the cooperation of Applied Data Research, Inc. and the Association of Data Processing Service Organizations, Inc. as well as *Computerworld* was greater than anticipated, according to Richard I. Miller, director of the study entitled "Legal Protection of Computer Software: An Industrial Survey."

More than 38% of the executives responded to the mailed questionnaire in contrast to the expected 15% to 20%, Miller said in remarks at the Contu meeting (see story on Page 5).

Miller described the typical respondent as being the president of his company, which is independently owned and less than 10 years old, has fewer than 100 employees, annual sales of under \$5 million and spends less than \$100,000 annually on research.

One of the survey questions asked respondents to indicate their use of various techniques including patents,

copyrights and trade secrets to protect software and to state their assessment of each one's effectiveness on a scale of 0 to 5, with 0 representing "not at all effective" and 5 representing "completely effective."

Thirty percent of the survey respondents answered the question; another 20% indicated the question was "not applicable." Fifty percent replied they did not know or did not answer.

Of those answering, 82% rated patents as "not at all effective" with the balance — 18% — calling them "fairly effective."

As for copyright protection, 55%

rated the copyright "not at all effective," with 5% calling them somewhat effective, 15% considering them "very effective" and another 15% calling them "completely effective."

Trade secrets were found to be "not at all effective" by 29% of the respondents, "rarely effective" by 5%, "somewhat effective" by 14%, "fairly effective" by 24%, "very effective" by 14% and "completely effective" by 14%.

In the area of use, however, patents were reportedly used to protect software by only 5% of the respondents, copyrights by 20% and trade

## Term Extended

WASHINGTON, D.C. — A bill extending by seven months the term of the National Commission on New Technological Uses of Copyrighted Works (Contu) was signed by President Jimmy Carter here recently.

Contu now has until July 31 rather than Dec. 31 to submit its final report to Congress and the President.

secrets by 21%.

Many respondents were reacting instinctively, Miller suggested, and were therefore not relying on actual experience in litigation, of which there has been relatively little so far.

## IBM Memo Admits Bundling Illegal

(Continued on Page 1)

According to these IBM memoranda, the firm was prompted to unbundle to some degree by the threat of several lawsuits as well as by the Department of Justice (DOJ) investigation, which started in 1967. In a document dated Dec. 18, 1968, IBM assistant treasurer Hillary Faw wrote that legal counsel for the firm "has asserted that those services represent an illegal and indefensible tie-in sale under the antitrust laws of the United States."

### IBM Brass Knew Tie Illegal

IBM executives had already reached this conclusion in September of that year, according to Faw — a prolific writer of memos later subject to IBM privilege claims. At a Steering Committee Meeting held Sept. 9, 1968, during which bundling alternatives were discussed, the IBM executives who attended "achieved unanimity on [the] existence and illegality of the tie," Faw wrote.

Aware of the market power gained from bundled pricing, "IBM retained the bundled environment for as long as possible. Its intent in doing so ... was to exclude competition and retain the ability to control prices," the government charged in its pretrial brief.

IBM set up a task force to analyze the bundling situation and available alternatives in 1968, and Faw suggested

himself as chairman because "[I] have personal experience in dealing with DOJ investigation officials on the intimate details of the IBM Corp. [I] know better than anyone else the extent to which DOJ can be confused or misled."

The task force prepared three reports for Cravath, Swaine & Moore, the firm's outside counsel and defense attorneys on the case. These alternatives were studied in the context of how they would affect IBM's profits, account control, competitors and customers.

But there also seemed to be recognition within the firm that by voluntarily unbundling portions of its package price, the firm could water down any legal threat to which it might be vulnerable. This attitude was displayed in one IBM document suggesting various alternatives to the "tie-in problem."

The idea was advanced that the Data Processing Division (DPD) could be broken into several geographic subdivisions, each one to be sold on a franchise agreement. This would have the effect of "throw[ing] sand in [the] eyes of DOJ ... [or would] make DOJ or [leasing companies] proceed against 100 to 150 independent dealers in order to break the tie."

In a memo outlining alternatives to bundling, Faw suggested that all systems engineering (SE) activities be priced separately, thus providing a "solution to the legal problem" but also causing "extreme disruption of business." However, if the firm only separately priced after-installation support, that might not provide a legal solution but "it would at least buy time" and cause "less disruption" than the first suggestion, Faw wrote.

### Selective Application

Faw also agreed with a government charge that the services supplied in the bundled price were applied selectively. "On a bundled price basis, we have the flexibility to direct these systems engineering guidance resources to where they will be doing the most good for IBM at any given time. Because we make no charge, we can apply or withdraw these resources essentially under our own control (Optimum employment of the squeaky wheel concept)."

### Programs Not 'Products'

In order to justify its bundling practice, IBM emphasized internally that software programs should not be described as "products" because that

would imply they could be priced separately, documents showed.

"We should recognize that discussing [applications] programs separate from the machines in advertising or presentations is inconsistent with our fundamental position that hardware and software including programs are an indivisible product," H. Bartow Farr of IBM's Legal Department wrote. "This inconsistency is not serious because our position is quite illogical to begin with," the attorney added.

In a later memo, Farr considered the legal implications of selling emulators, which were "primarily software," and Cravath's concern that "this erodes our defense that we are unable to price software." However, "my position has always been that of course we can price software and if our defense to unbundle depends on that fact, we are in desperate trouble," Farr said.

Once IBM decided to unbundle, it began to determine how best to deal with any adverse reactions it would encounter. Another Faw document, which the government claims was used at a May 6, 1969 Management Review Committee meeting, suggested that the firm develop a "communications strategy" that was consistent with its "legal rationale and strategy."

"What we say can have a direct bearing on what we may be required to pay!" Faw emphasized, referring to possible efforts by leasing companies to obtain cash rebates after the unbundle announcement.

In this same memo, Faw summarized the reasons for IBM's decision to unbundle and the problems that would accompany that decision. One problem would be that "it seems to indicate awareness of [a] legal problem," he said.

However, IBM decided to unbundle "not notwithstanding our continued belief that timing was probably too soon (no structured market — uncertain business opportunity for software services at this time)" because it would "rather err by being too early than by holding [a] single price too long," he wrote.

When IBM did decide to unbundle software and services, it kept control programs as part of the bundled price. The adverse reaction of competitors to this move could be the assumption that "by keeping control programs in the bundle, IBM will continue to maintain a decisive lead time advantage over all independent software developers" and other competitors seeking to market IBM-compatible equipment, Faw warned.

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'Knowledge,' 'Information' Not the Same

## Contu Told to Define Terms and Clarify Issues

By Brad Schultz  
CW Staff

CAMBRIDGE, Mass. — A more precise definition of terms and further clarification of issues is needed before decisions can be made on how best to protect software, the National Commission on New Technological Uses of Copyrighted Works (Contu) was told at its 18th meeting here recently.

MIT Prof. Joseph Weizenbaum criticized the use of the terms "information" and "knowledge" as if they were interchangeable.

"I fear for our children when the distinction between information, knowledge and wisdom is increasingly blurred," he said. Such terms as "program," "what we mean when we say 'something doesn't work'" and "what a book says" compared with "what a computer says" should be well-defined and understood by the commission, he added.

Another MIT professor, J.C.R. Licklider, expressed agreement on the point, noting that some see a program as data while others see a program as operating on data.

A program is very much like a machine; when energized, both create process, Licklider said. One must know what a program is prior to knowing how to protect it.

Licklider said he was concerned about whether the commission is seeking to protect "the things which are really of value."

### The Real Issue

Dr. Lee Burchinal of the National Science Foundation indicated that the issue in software protection, from a technical standpoint, is not in knowing who is using a system or program or data base, but in knowing what that person does with the material after accessing it.

The computer can know that a person has accessed it and for how long, but is generally blind to such possibilities as illicit hard copying of printed output, he explained.

In considering the need for data base protection, Weizenbaum pointed out that dynamic data bases — comprised of data which is frequently changing — generally run more risk than do static data bases — those having little or no change in constituent data (for example, a Table of Integrals).

The entity which deserves protection, however, is not just the data, but also the logic behind it, Weizenbaum continued.

Explaining why it would be "ill-advised" for someone to simply copy a program into a computer, Weizenbaum said programs must be maintained — a program which has run perfectly a number of times on a given system will inevitably develop bugs even on that system.

A program stolen in machine code form would be useless, he said, since machine code is peculiar to the machine.

Licklider remarked that "eavesdropping in people's files is not necessarily bad." As an example, he told of a research paper by another MIT colleague — Marvin Minsky — generally accessible throughout its development to other researchers via the Arpanet

computer network.

Many who accessed the paper input their own criticisms and the paper turned out better in quality as a result, Licklider stated.

A number of individual presentations also heard by Commission members focused on either the current state or the future of computing.

Computer hardware cost-effectiveness was seen by Licklider as rising geometrically (that is, doubling every two years) between 1943 and 1999.

Licklider predicted that while software will not develop as rapidly as hardware, it will not hold back the development of hardware. The controlling factor in overall computer develop-

ment will be legislation and people's attitudes, rather than inherent constraints in the technology, he said.

### DP in Education

Personal computing and computer-assisted education were discussed by Dr. John Schoch of Xerox Corp.'s Palo Alto (Calif.) facility, where local high school students have turned out projects in computer art and graphics — for example, in film animation and machine simulation.

A film documentary of the students' work was presented, and Schoch suggested that, as minicomputer/graphics systems diminish in cost and physical size, such capabilities will enter the

scope of personal computing.

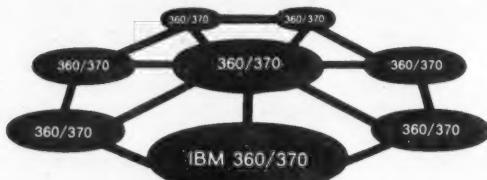
Two economic factors which might retard future application of computer technology to libraries were mentioned by Prof. William Baumol of Princeton University and New York University and by Chuck Goldstein of the National Library of Medicine.

Baumol told the commission the cost of library storage and retrieval will consistently rise at a compounded annual rate — after inflation — of 5%.

Goldstein indicated the federal government's reticence in applying computer technology to its library operations might be attributed to fear of resultant layoffs.

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# IBM Unveils Graphics System From Sanders

(Continued from Page 1)

come out of the agreement between the two firms in which Sanders agreed to drop its antitrust suit against IBM in exchange for the right to develop "advanced computer-related products for IBM" [CW, Jan. 31]. Sanders has received an \$18 million contract to build the 3250 for IBM.

The 3250 is similar to the type of display equipment that was the focal point in the Sanders-IBM lawsuit; earlier Sanders display equipment utilized some of the same IBM software that now operates with the latest display, according to industry sources.

As part of the antitrust settlement, IBM agreed to pay Sanders \$4 million for application of Sanders technology to be used in future IBM products. Payment of \$3 million by IBM was agreed on for "certain minimum production commitments" and another \$3 million was paid to Sanders for the purchase of products from inventory.

Since settlement of the suit, the Sanders Data Systems Division has been sold to Harris Corp. But the 3250 will be manufactured by Sanders' Federal Systems Division, which was not affected by the sale to Harris.

In keeping with established policies, neither Sanders nor IBM would comment on whether additional Sanders products will be introduced by IBM.

"IBM has had other companies manufacture products in the past," a company spokesman said, but added the firm would rather not give specific details about earlier agreements. An industry source, however, said it is believed the earlier agreements involved peripheral equipment and a software package from independent vendors.

#### Performance Details

The 3250 display system is said to provide faster image generation which in turn provides an increased amount of graphic and alphanumeric information that can be displayed. The 3251 display station includes a separate

keyboard to allow the operator to call up program functions from an IBM 370 CPU.

The display provides three times more screen content than the earlier 2250, handles four character sets instead of two as on the 2250, adds lower case and the vertical display of alpha characters and has a blink feature when invalid data is entered, IBM said.

No change is required in basic programming when a user upgrades from the 2250 Model 3 to the 3250, but some additional programming may be required to handle lower case character display. The 2250 operated with four display units per buffer while the 3250 handles two displays and this may also require some modifications.

The 3250 includes a light pen and

two keyboards. The light pen is used to indicate the position of lines, curves or arcs and it can be used to move sections of a display image within the 12-inch screen area.

An alphanumeric keyboard is used to enter design data, dimensions and so forth, while a 32-key program function keyboard allows special functions such as zoom or rotate to be handled in one keystroke. Eight programmable intensity levels are available on the screen with three under control of the light pen.

Software support is provided through the IBM Graphics Programming Service (GPS). GPS includes the Graphic Access Method (Gam) and the Graphics Subroutine Package (GSP), which runs under OS/VS1, OS/VS2

or VM/370.

A 3250 graphics display system is available on a purchase-only basis and consists of one or two 3251 display stations linked to a 3255 display control. Up to four of the display controls can be attached, at a maximum distance of 5,000 feet, to a 3258 control unit, which in turn is linked to a 370 processor.

The 3251 graphics display station may be purchased for \$17,460, the 3255 display control for \$37,200 and 3258 control unit for \$39,750, IBM said, while a typical 3250 system, with four display stations, two display controls and a control unit may be purchased for \$183,990. First deliveries are scheduled for the fourth quarter of 1978.

# White House Study of FBI Plan Urged

(Continued from Page 1)

This latest wave of congressional concern over NCIC operations stems from letters written by Deputy Attorney General Peter F. Flaherty informing congressmen the FBI has been directed to continue the NCIC's Computerized Criminal History (CCH) program [CW, Oct. 17]. Further, the FBI has a mandate to come up with a comprehensive "blueprint" for a decentralized CCH program that would allow the states to maintain physical control over their own criminal history records.

Once this blueprint is approved by the Attorney General and Congress, Flaherty said, the FBI should acquire the necessary communications equipment to permit creation of a national CCH index and NCIC-CCH message-switching operations. The plan calls for the installation of this equipment before October 1978.

The Deputy Attorney General stressed that the Justice Department has no preconceived notions about what ultimate choices should be made for NCIC. "The goals which we shall

be striving toward include identifying and implementing the type of system(s) which satisfy both the spirit of our constitutional democracy and the needs of our criminal justice community," he said in a letter to Moss.

#### Warning From Moss

Appealing directly to Attorney General Griffin B. Bell, Moss suggested that message switching "especially, but not conclusively in connection with CCH, has an importance far transcending its innocent and innocuous-sounding name."

"It relates to problems of preserving privacy and maintaining control over expansion of federal influence in state and local law enforcement in an age of increasing dependency on electronic communications," he stated.

In Moss' view, the proposed Justice-FBI plan only appears to be a process for decentralizing CCH records. "States would indeed retain physical control over the majority of their records, but state data banks would be interconnected with one another through the communications hub controlled by the FBI," he warned.

"State computer banks interconnected by NCIC message switching and augmented by the NCIC-CCH-multistate offender file is clearly a national data bank and should be recognized as such," Moss said.

Recalling that 10 years ago Congress gave a previous administration's proposal for a national data bank "a resounding denial" because of the potential abuse of such a powerful mechanism, Moss urged Bell to prevent the plan from going forward.

Edwards, who chairs the House Judiciary Committee's Subcommittee on Civil and Constitutional Rights, which has FBI oversight responsibility, told Justice he appreciated the fact that the department has no preconceptions concerning the resolution of various NCIC issue areas.

"My only preconceptions are to assure that security and privacy considerations are properly dealt with, that the system is cost-efficient and that the proper balance between federal and state responsibilities is struck," Edwards said.

Any effort to decentralize CCH records necessitates federal and state adoption of agreed-upon minimum standards to assure security, privacy, accuracy and completeness of infor-

mation, Edwards stated.

Both Edwards and Moss questioned the need for an NCIC message-switching capability since the states already have an interstate message-switching service provided by the National Law Enforcement Telecommunications System (Nlets).

If it is found that the states are generally satisfied with the Nlets service for the timely exchange of such information as data on stolen vehicles or missing persons, non-CCH message switching by the FBI would not appear desirable or necessary, Edwards said.

With CCH decentralization, Nlets or a system like it could serve the states' needs just as efficiently: "The need for a speedy response certainly does not exist for CCH records, generally, as it does for non-CCH records, and that consideration deserves serious thought in determining the proper facility to handle this service."

#### Could Be Illegal

FBI switching of state-to-state communications may be illegal, both in terms of the law under which federal agencies can provide such services and under the FBI's authorizing statute, according to Moss. There is a specific prohibition against the FBI intruding in state and local law enforcement.

The congressmen also concurred that the NCIC Advisory Policy Board needs more independence from the FBI itself. The board's charter suggests it is no more than an arm of the FBI, unable to function in an independent advisory function, Moss said.

Edwards recommended that the FBI consider adding knowledgeable persons to the board who are not directly involved with NCIC, but who might be helpful in deciding security, privacy and technical issues.

The Justice Department has embarked on a study to assess state law enforcement needs, hoping to settle the question of whether the FBI should maintain CCH records or get out of this area. Four regions of the country have been selected for participation in this project, according to a staff member of the House Civil and Constitutional Rights Subcommittee.

The House subcommittee will hold further hearings on the FBI's message-switching plans and the federal role in state and local law enforcement; however, no dates have been set.

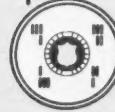
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## Preyer Asks GAO for Major Survey

# HEW Review of Security Sparks Call for More

By Edith Holmes

CW Staff

WASHINGTON, D.C.—The results of a Department of Health, Education and Welfare (HEW) review of its own computer security has prompted a congressional request for "an immediate examination" of computer security program effectiveness in all of the federal government's major record-keeping agencies.

Conducted from October 1976 through March 1977, the HEW review found that "DP systems security in HEW was far from meeting minimum acceptable standards."

HEW organizations were in compliance with only 55.6% of the standards devised by the department following the passage of the Privacy Act of 1974.

In addition, while a few HEW computer facilities approached full compliance with the minimum standards, the average level of organization compliance was only 36.9%, according to the internal report.

### 'Disquieting Findings'

"The task force findings are disquieting because they pertain to an agency with a longstanding commitment to the personal privacy of its clientele," Rep. Richardson Preyer (D-N.C.) said recently on the floor of the House of Representatives.

Suggesting the HEW computer security experience may be "commonplace" at best, Preyer informed the House he has asked the General Accounting Office (GAO) to examine the status of computer security at other major recordkeeping agencies.

Preyer, who chairs the House Subcommittee on Government Information and Individual Rights, complimented HEW for establishing security standards and initiating a self-assessment of compliance with them. He cautioned the department, however, not to lower its standards "as an easy way to achieve a seemingly higher level of compliance" with the Privacy Act requirements for safeguards.

HEW's DP systems security review task force, convened by the Assistant Secretary for Administration and Management, conducted 93 on-site reviews of department installations here and in 25 other U.S. locations.

Major problems identified by the task force included a lack of organized programs to ensure security; insufficient management control over systems development and maintenance; a lack of or inadequate contingency and disaster plans; and a lack of training in

risk management.

The task force concluded HEW's Office of Management Analysis and Systems "should have supported the DP security program more aggressively" and "a need exists to review, update and reissue the DP systems security standards. Some organizations, for example, objected to the administration of an oath to prevent disclosure of information."

Certain standards, such as controls over the access to computers, need to be added to the HEW minimum compliance lists, the task force determined. Finally, the intent of some of HEW's computer security standards appears to have been misunderstood, the re-

port stated.

In a letter to Preyer, HEW Secretary Joseph A. Califano Jr. said "reasonable" security would be an expensive, unrealistic proposition. "Rather, we need security measures which strike an appropriate balance between the potential risks and the resources required to protect systems against those risks," he wrote.

The HEW Secretary also expressed the concern that systems security be put into perspective with the department's other management priorities.

Califano has approved the task force recommendation that a vigorous corrective action program be implemented that would end violations of HEW

computer system security standards by next October. The review of the standards themselves is already under way.

Along the lines of the task force's recommendations, the Assistant Secretary for Management and Budget has recruited a DP systems security officer for the Office of the Secretary.

In addition, the Social Security Administration (SSA) has reported it has corrected or is in the process of eliminating 85% of its violations of the HEW standards.

The Public Health Service, which scored a 69% compliance rate during the task force review, has initiated a coordinated effort to assure complete compliance with the standards.

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## Picks Up Abnormal Sounds

# Mini, Stethoscope Linked to Detect Aneurysms

By Brad Schultz  
CW Staff

CINCINNATI — Researchers at the University of Cincinnati College of Medicine here have developed a means of detecting a cerebral aneurysm in a stroke-prone person before the aneurysm has ruptured.

Sounds indicating the presence of an aneurysm — a weak spot in a blood vessel — are detected by a special stethoscope outside the body, recorded and then analyzed by a minicomputer.

The sounds are caused by blood abnormally swirling through the weak, ballooning vessel, researchers at the medical school's Stroke Research Laboratory explained. Spasms or constrictions of a vessel, believed by many to be a factor in strokes caused by ruptured aneurysms, are recorded as a hum. The special stethoscope can detect these musical tones, according to Dr. Charles P. Olinger, a professor of neurology who heads the project team along with Jack F. Wasserman, Ph.D., a professor of engineering and research associate in neurology.

Olinger began his research seven years ago after realizing an aneurysm emits a musical tone that can be picked up by a microphone. He reasoned that investigators might be able to hear the sounds from outside a patient's head.

Wasserman, then a graduate student

in engineering, began working on the problem with Olinger. The computer-based detection system was the result.

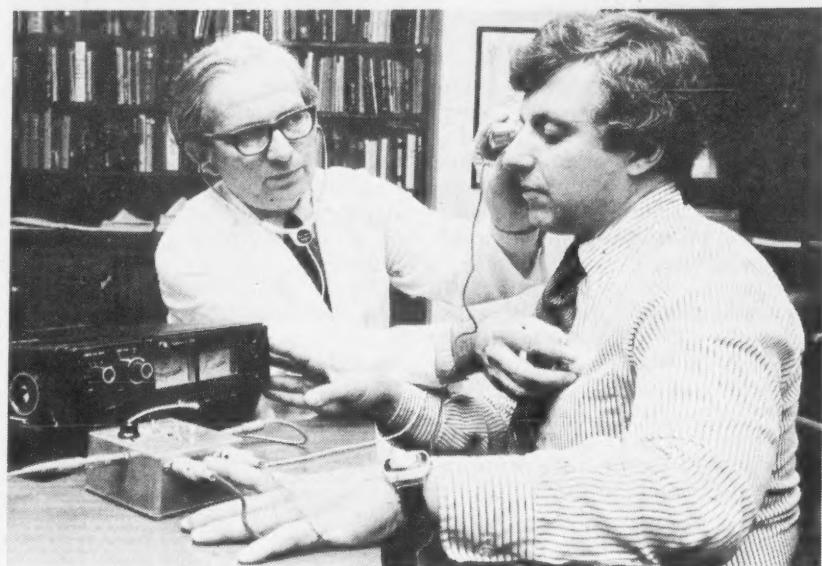
The system consists of a Hewlett-Packard Co. 21MX minicomputer with 32K (16-bit) words of memory, an HP 7900A dual-disk system, a Tektronix, Inc. 4012 graphics terminal, a Tektronix 4631 hard copier and a Biomation Corp. 8100 signal processor, according to a biomedical engineer in charge of the system. HP 5451 Fourier analysis software is employed to analyze the acoustic signals, according to the engineer.

A portable battery-operated stethoscope system records the signals for processing. Such examinations can be done in emergency wards, in outpatient departments or at the patient's bedside.

The process is not painful or disconcerting to the patient, Olinger and Wasserman noted.

Olinger pointed out that stroke is the third most frequent cause of death in the U.S. and is often preceded by aneurysm formations. For every five patients with ruptured aneurysms left untreated only one will be alive and well at the end of a year, another will be disabled and three will be dead.

"The aneurysm problem is particularly frustrating since it is felt by



Olinger (left) demonstrates the stethoscope computer equipment on Wasserman.

many that almost half of the patients with intracranial aneurysms develop warning symptoms before a major rupture — in many cases, sudden onset of headache or dizziness," Olinger said.

Until the computerized stethoscope technique becomes generally available, the only method on hand for diagnosing the presence of an aneurysm is

angiography, which involves injecting chemicals into the blood stream and x-raying the patient.

Angiography "entails expensive hospitalization, trauma and patient risk and therefore is not suited for investigating vague warning symptoms, even though these symptoms might precede fatal aneurysm rupture," Olinger said.

## Kansans Building System To Assist Drug Prescription

By a CW Staff Writer

KANSAS CITY, Kan. — A computer system to assist physicians in prescribing drugs for their patients is being developed here at the University of Kansas Medical Center.

Funded out of the medical center's general teaching budget, the project's primary aim is to produce an educational tool for practicing physicians as well as medical students. However, the system is also conceived as an aid in routine drug prescription decision-making that will be available when perfected to the general medical community.

"This is a rapid way of getting doses and side effects of drugs, which really means better care of the patient in the long run," according to Dr. Stanley R. Nelson, professor of pharmacology. Nelson and his associates have been developing the system for about a year using an IBM 370/158 with the IBM Coursewriter III package.

"A terminal linked to our computer might be as valuable to a doctor as his *Physician's Desk Reference Book*," Nelson said. "For example, a patient might have a persistent cough. The doctor types in 'cough' on the terminal keyboard, and the system will display on a TV-like screen all the drugs used in treating coughs."

"The problem might be epilepsy. The doctor enters 'epilepsy,' and the system will ask him which of several types he is treating. He enters that name, and the computer lists the proper drugs and dosages."

Aside from offering physicians information on which drugs might be prescribed, the system will provide a

means of studying side effects of prescribed medications, their interactions with one another and how the medications treat disorders.

### Good for Groups

Physicians hundreds of miles away could access the medical center's CPU and thus use the system, Nelson indicated, noting that a group practice could rent a terminal for this purpose.

For users hundreds or thousands of miles distant, however, Nelson considers it more practical to store the software on cassettes and then send the cassettes to the users through the mail for implementation on their own hardware.

In building the data base of therapy recommendation, Nelson and his associates have been assisted by specialists in many fields of medicine. According to Nelson, the key problem at present is acquiring these recommendations and adding them to the data base.

The project team is eager to complete the project before "some vested interest groups" develop their own system of this type and then market it with some bias, Nelson said.

The project team is also cautious about delivering its system before having amassed a relatively full inventory of therapy information, since premature delivery might cause a number of physicians treating difficult cases and anxiously seeking therapy information to expand time, energy and money accessing the system only to discover no data available for their needs.

The project will take about one more year, before completion, he said.

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# Visa Head Says Public Will Never Go Cashless

**SAN FRANCISCO** — The idea of a cashless and checkless society "is an exercise in ego which the public will never accept," Visa credit card's president contended here recently.

"No such system has or ever will exist," Dee W. Hock, president of Visa U.S.A., Inc. told computer experts and financial officers attending a National Retail Merchants Association conference on data processing and communications.

Although acknowledging "an accelerating evolution in the exchange of

value" by electronic impulse rather than paper, Hock asserted, "it will never replace paper. Customers will forever demand something more permanent as evidence of transactions than an ephemeral visual image on a terminal."

However, Hock noted that the number of credit card users is increasing by 30,000 per day and predicted that multipurpose cards like Visa will become "a worldwide device for the exchange of all forms of value wherever stored."

Hock called efforts to standardize electronic financial services "the most expensive, least effective, slowest way to utilize electronics."

Technology should be applied with a focus on specialization, he indicated,

pointing out that DP systems are now geared to inventory control in retailing, to reservations control in the hotel and airlines industries and to transactions monitoring in the supermarket industry.

## Real Challenge

"The real challenge is to connect elements owned and operated by retailers to those operated by financial institutions in order to better serve customers," Hock said.

Hock noted that Visa cards drawing on savings accounts, investments or other equities "unlock a value reservoir to which merchants have never had access, and the recent rush of savings banks, savings and loans associations and credit unions into the Visa

system reflects their conviction that customers want a 24-hour-a-day, seven-day-a-week access to those resources from the point of sale."

He predicted that "investment houses, insurance companies, mortgage companies and other repositories of value will provide card access to the value reservoirs they hold."

"When cards such as Visa reach their full potential, they will identify a customer from anywhere in the world in full possession of all his assets, whether credit, deposit, investment, or equity — a customer ready to exchange them for whatever you sell," the retailers were told.

Customers "will pay well" in the long run for these services and about who provides them.

## Two Seminars Aimed at Aiding Negotiation Skill

**NEW YORK** — Courses aimed at beefing up the legal, financial and psychological skills needed in contracting for DP products and services will be sponsored by both the ACT-Brandon Co. and the Management Research Corp.

"Computer Contract Negotiation," a three-day course offered by the ACT-Brandon Co., will address such questions as how to get the vendor to agree to negotiate to a nonstandard or expanded contract, what terms are really significant to the user's interests and how the user can position himself for effective negotiation.

Conducting the course will be Joseph Auer, a computer negotiator, Dick Brandon, an expert on computer contract negotiation, and Sidney Segelstein, a legal authority on computer contracts.

The seminars are scheduled for Dec. 5 in Washington, D.C., March 6 in Atlanta and June 5 in New York.

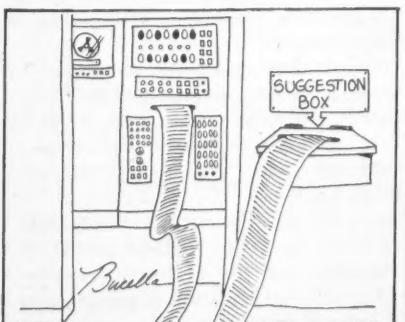
The registration fee, including course text, reference materials and copies of "Computer Negotiation Report," is \$575. ACT-Brandon is at 437 Madison Ave., New York, N.Y. 10022.

Management Research Corp. will present "The Art of Negotiating," a two-day course that will base its approach on the idea that a person can succeed in making negotiations more productive by creating a solution in which both sides win.

The course will feature lectures and demonstrations by Gerard I. Nierenberg, founder of Negotiations Institute, Inc., and Richard A. Zeif, secretary to the institute.

The course will be conducted in Boston on Dec. 5 and in San Francisco on Dec. 8.

The registration fees are \$450 for an individual and \$395 for groups of two. Additional information can be obtained from the Management Research Corp., Sussex Building, 1430 Larimer Sq., Denver, Colo. 80202.



## Just published . . . A landmark book on structured programming

When Paul Noll came to me with his idea for a structured programming book, I was skeptical. First, I wasn't sure that structured programming offered anything of importance to the programming profession. Second, I wondered what his book would say that other structured programming books hadn't already said.

Now, I'm convinced. Structured programming is here to stay because it is a better way to design, document, code, and test programs. Furthermore, I believe Paul's book, *Structured Programming for the COBOL Programmer*, will have a major effect on programmer productivity because it presents the first method for implementing structured programming that is complete, consistent, and practical. And the book is chock-full of ideas that cannot be found in any other book or course on structured programming.

### Who this book is for

At the present time, there are thousands of COBOL programmers who are not writing structured programs. That means that the average COBOL shop can experience major gains in productivity by implementing an effective system of structured programming. As a result, this book is designed for the experienced COBOL programmer.

Although this book assumes familiarity with COBOL, it should also be of value to any data processing professional who comes into contact with programming projects, regardless of the language used. The chapters on design and documentation are largely independent of language considerations. And these chapters alone should justify the cost of this book.

### 4 reasons why this book is effective

1. The author, Paul Noll, has been a software specialist for a large company in San Francisco. He is currently responsible for the training of 250 programmers. As a result, his programming methods are superb, and his teaching methods are effective.
2. Paul never presents theory without showing its application. In contrast to other books and courses, this book is based around the development of four different kinds of business programs. Once you see how Paul's method is applied to these problems,

you will forever see the value of structured programming.

3. This book is designed specifically for the COBOL programmer. As a result, you will see all of the structured coding techniques in COBOL (and only COBOL). You will also see how design and documentation are related to the programming language used.

4. This book contains dozens of illustrations taken from all phases of structured programming. You'll see structure charts and HIPO diagrams for each of the four programs developed in this book; you'll see structured COBOL, program stubs, test plans, walkthrough agendas, and much more. In my experience, these illustrations, more than any other factor, determine whether an EDP course is effective . . . and they are the missing ingredient in other structured programming books and courses.

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# HEW Critiques Medical Records Proposals

By Edith Holmes  
CW Staff

WASHINGTON, D.C. — The Department of Health, Education and Welfare (HEW) "generally endorses" the protections devised by the Privacy Protection Study Commission for medical records.

Focusing on institutional records that "contain a substantial portion of the recorded health care information about individuals in this country," HEW said in a report to Congress that the

privacy commission's recommendations could be implemented without creating major conflicts with existing state and federal law.

Further, the commission's proposals concerning these records would mean "a minimum of burden and paperwork for the institutions," HEW Secretary Joseph A. Califano Jr. wrote in a letter that accompanied the report to Congress.

Congress took HEW's views into account in revising legislation proposed

by Representatives Barry M. Goldwater (R-Calif.) and Edward I. Koch (D-N.Y.) that would implement the privacy commission's medical record recommendations, according to a House subcommittee staff member. Koch's and Goldwater's H.R. 8283 has been replaced by H.R. 9989, which in turn has been incorporated into omnibus privacy legislation.

Additional laws protecting medical records are necessary "not because of a large number of improper disclosures and other abuses, but in the interest of bringing overall order to the scheme of statutory protection" and to strengthen existing safeguards against possible future abuse, Califano said.

Like the privacy commission, HEW avoided commenting on the confidentiality of records in the offices of private physicians, leaving such matters to state laws and organizations.

## 'Fair Handling'

In general, HEW proposed that legislation be passed to govern "the fair handling of medical records held by certain providers of health services." Fair handling would include requirements for patient access, correction by the patient, prohibitions on disclosure authority for disclosure without consent under some circumstances and standards for the content of patient authorization to disclose records.

"Adherence to these rules, for the records of all patients, would be required of medical institutions as a condition of participation in the Medicare and Medicaid programs," the report said.

Violations of any federal law concerning medical records would subject the institutions to loss of certification and to civil suits by individuals harmed by the violations, HEW added.

The department would like to see any federal law give HEW the authority to require medical care institutions, subject to survey and certification for participation in Medicare and Medicaid, to meet privacy standards regarding the records of their patients as a condition for initial and continuing certification.

"The vast majority of institutional medical records in the country would thus be subjected to the rules, since institutions certified for Medicare and Medicaid account for 95% of hospitals and at least 75% of long-term facilities which provide some nursing care," the report stated.

While it found the proposal "to extend these rules to all medical care assisted in any way by the federal government" appealing, HEW counseled Congress that such coverage "is too sweeping for effective management and enforcement at the present time." The department affirmed the privacy commission's belief that by tying medical record standards to Medicare-Medicaid certification, individual rights will receive "substantial protection."

HEW recommended that patients desiring a copy of their records be charged for the cost of reproducing it, but not for any search or preparation time the institution spends on it.

Agreeing with the commission that parents should not have access to the records of health care which minors

have sought for themselves and received without parental knowledge or consent, HEW suggested that additional regulations governing access be handled by the department itself.

## Prohibitions on Disclosure

The department agreed, with no additional comment, to the commission's recommendation on the means for correcting medical records. The commission's prohibitions on disclosure of these records, however, brought a host of remarks from HEW.

There are several "carefully chosen" situations in which institutions should be permitted to disclose patient records without consent, HEW maintained in its report. In these cases, authorization for release of the record by the individual would be irrelevant, would thwart an important public interest or would be inappropriate or unnecessary in some other way.

"Safeguards such as notification to the individual and accounting help assure that such disclosures are carefully controlled," HEW asserted. "In addition, when a record is originally established, the individual must be told of the possible uses that may be made of information about him without consent."

Medical record uses that should not require specific consent include consultation in the course of medical care; actions taken in an emergency health or safety situation; several types of research — particularly epidemiological and biomedical research — which study the course of a disease in the population; audit, investigation and evaluation of health care institutions; and fulfillment of public reporting statutes and lawful judicial and administrative processes, according to HEW.

"We recommend that an institution be permitted to disclose individually identifiable records for research purposes if it has made a reasonable determination that: 1) the disclosure does not violate the conditions or limitations under which the information was obtained; 2) the disclosure in identifiable form is necessary to the research purposes; 3) the research is of sufficient importance to justify whatever risk is involved; and 4) there are adequate safeguards to protect the record from unauthorized disclosure," the report said.

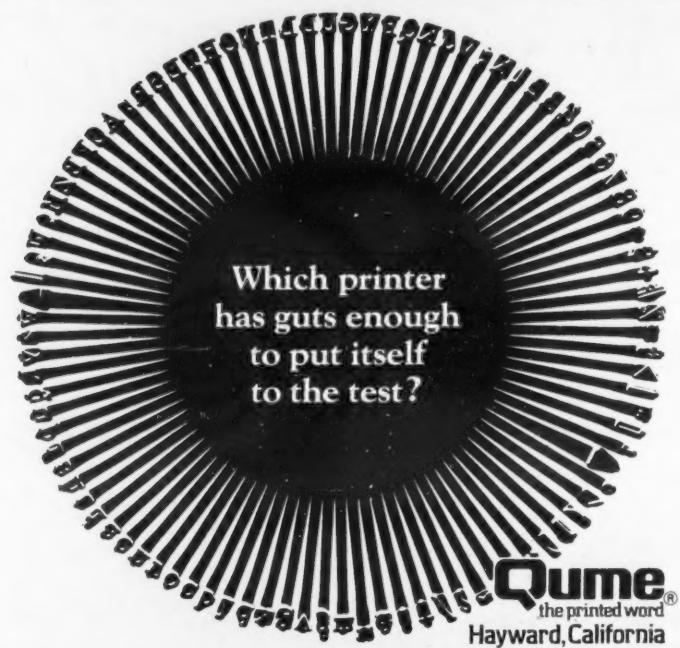
HEW suggested that its concern for the availability of identifiable health records for audit purposes stems from an awareness that "there is a serious problem of fraud and abuse in publicly funded medical programs."

## Insurance Purposes

While HEW would sanction "permissive authority" to disclose health records for research purposes, the department believes authorization for disclosure to insurance companies is "overly broad."

Any authorization for disclosure of medical information to insurance companies and others like them must be dated and signed by the individual or someone authorized to sign for him, HEW said.

In addition, the nature of the information to be disclosed must be specified and the person or entity to whom the information is going should be spelled out.



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## Auditors Lack DP Know-How

# Federal Systems Auditing in Bad Shape: GAO

By Tim Scannell  
CW Staff

WASHINGTON, D.C. — Internal auditing of computer-processing in the federal government is severely inadequate, according to a report published by the General Accounting Office (GAO).

Many internal auditors assigned to assure computer systems are operated efficiently, economically and reliably lack even a minimum of DP knowledge and training, the study found.

Data processing has become an es-

\$31.5 million after reviewing a proposed management information system.

Matters considered included the adequacy of objectives in relation to user needs, cost reliability and the validity of the technical requirements. The survey was conducted at 15 sites, several headquarter groups and with the system development group itself.

It was discovered that the original analysis of the problem was inaccurate and unsubstantiated. It was also learned that technical and equipment specifications were not proven and

Over the years, standards have been developed for measuring the quality of audit work. The American Institute of Certified Public Accountants, the Institute of Internal Auditors and the U.S. Comptroller General suggest the following requirements for DP auditors:

- A basic understanding of computer systems, including equipment components and their capabilities.
- A basic understanding of computer

operating systems and software.

- A familiarity with file-processing techniques and data structures.
- Sufficient knowledge of existing standardized audit packages.
- The ability to review and interpret system documentation including flowcharts and record definitions.
- A general familiarity with the dynamics involved in developing and modifying programs and systems.

## How's Your Auditing?

WASHINGTON, D.C. — Just how good is your DP auditing system? SRI International suggested at a recent conference here that users try to answer the following questions:

- Does your organization have a DP audit function? Does it function?
- Does top management have an accurate understanding of the level and timing of involvement of internal audit in DP?
- Does your DP audit organization have a management mandate? Is it observed?
- Does your organization have an adequate loss-reporting system?
- Does top management make

periodic assessments of audit controls?

- Are control guidelines and standards in place in your organization?
- Are DP audit tools and techniques used?
- Is your DP audit training budget adequate for your needs?
- Are the three players — the user, DP audit and internal audit — working together or are they at loggerheads?
- Does top management really take an interest and provide support by taking the time to look at this area and understand it and by providing the necessary funding to get the auditing job done?

ential and integral part of nearly every segment of government activity with more than 10,000 computers at work and an annual budget in excess of \$10 billion. For this reason, internal auditors should be capable of helping management ensure these immense resources are used and controlled effectively, the study said.

Computer auditing can be generalized into two broad categories, according to the GAO. The first is the auditing of a computer application.

If an auditor is assigned to review a computerized payroll system, for example, his work will encompass such matters as the adequacy of various controls; controls over material input to the computer; controls over the integrity of the computer's processing; and controls over computer output, the report said.

The second type of DP auditing is much broader and goes beyond the computer itself. This type of work involves questions such as: Is the system properly designed? Is there a valid requirement for the system? Is the computer being operated efficiently? Is the computer configuration appropriate for the work to be performed?

Generally, independent public accountants who audit private corporations are concerned primarily with the first type of computer auditing because their work is often aimed toward verifying financial statements produced by the system, the GAO said.

### Significant Benefits

The organizations where effective auditing is being done, results have been significant, the report pointed out. The Air Force Auditing Agency, for example, avoided having to spend

that users believed there was little need for a proposed on-line data base.

The audit resulted in a major change in the scope, equipment and personnel requirements for the system.

Another example is the Naval Audit Service, the GAO said. After conducting a routine review of a computer system installed at a Marine Corp facility, the service discovered that adequate standby equipment was not available in the event of a protracted power failure or troop deployment.

### Surplus Found

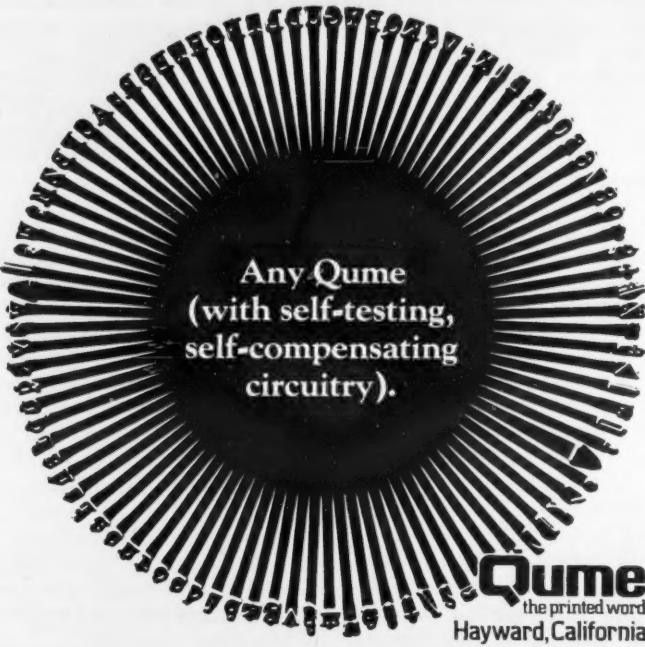
A surplus of unnecessary equipment was also revealed in the course of the study. These findings prompted the right people to obtain funds to acquire the standby equipment and release unnecessary items, the GAO pointed out.

Although these examples show the significance of good internal auditing, the report stated, no agency has yet achieved an adequate level of overall capability and coverage in DP auditing.

Within the Department of Defense — which had more than 4,420 computers as of June 30, 1976, and many wide-ranging automated data systems applications — the limited expertise and need for more training are pronounced, the study said.

### 234 Auditors Without DP

In a statement to the Senate Committee of Defense on Government Operations, the Deputy Assistant Secretary of Defense for Management Systems reported that out of a total audit staff of 2,264, only 234 auditors (about 10%) were considered to have extensive DP training and experience, the GAO report noted.



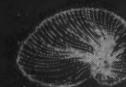
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# Keeping Curricula Timely Seen Challenge to Colleges

By Esther Surden  
CW Staff

SEATTLE — In a small college, keeping up with technology is the single most challenging aspect of providing students with marketable DP skills, participants in a conference panel agreed here recently.

Of the 56 students who graduated from the computer science program at the Oregon Institute of Technology (OIT), 53 have been placed in career-related positions despite the fact that the school is at least two years behind in teaching new hardware and software subjects, according to Frank Vaskelis, director of the college's computer center.

A successful program must have several elements, he noted. First, the school's administration must make a monetary commitment. Second, the college must encourage its staff to participate in a program of staff improvement and professional development. Third, programs offered should enable graduates to be employable, and these programs should be continually evaluated.

OIT uses several methods to find out what skills employers need and to make its graduates valuable to them. These include consulting an advisory committee from science, business and government, interviewing recruiting officers from various companies and surveying its recent graduates to find out how well-prepared they felt they

were for their jobs.

Another method is a survey of businesses to directly ask management what the firms need in their DP employees. Such a survey recently resulted in a decision to offer a course on microcomputers, he recalled.

But other aspects of education can be important, too. At Angelo State College in Texas, communications skills are emphasized to prepare graduates for making oral presentations to employers and for communicating about projects, according to F.C. Homeyer, associate professor at the school.

Students meet rigorous requirements to produce term papers, article summaries, chapter reports, program progress reports and written documentation, he told the group.

Angelo State offers students two degree paths — a B.S. in computer science and a business administration degree. Students following both paths take the same courses for two years and then diverge. The business students are prepared for a career in commercial DP, while the computer science students go into more theoretical areas. Since the major was established in 1971, 40 students have graduated from the program, he added, noting that the students have usually been able to find jobs.

More significant than that, he indicated, is that "each employer of our graduates had returned to the campus to hire more" students.

## Call for Papers

1978 POWER ELECTRONICS SPECIALISTS CONFERENCE, Syracuse, N.Y. June 13-15, 1978.

The conference will emphasize current and specialized component and systems technology in the areas of power, electronics and control. Topics, dealing with component/circuit interactions, include lower cost power devices for mass markets, power capacitors and magnetic components, weight minimization, forced commutation, HF induction heating and advanced terrestrial energy power processing and transmission.

Five copies of a 300- to 500-word summary and two copies of a 35-word abstract should be sent by Dec. 5 to Program Chairman Yuan Yu, TRW Defense & Space Systems Group, One Space Park, Redondo Beach, Calif. 90278.

TENTH INTERNATIONAL QUANTUM ELECTRONICS CONFERENCE, Atlanta, Ga. June 29-June 1, 1978.

The conference will discuss new phenomena and materials, physics of basic devices, advances in theoretical understanding and new scientific applications in the field of quantum mechanics/electronics. Papers are sought in such areas as excitation mechanisms leading to population inversion, laser chemistry and isotope separation, interaction of high intensity radiation with matter and low temperature quantum electronics.

Two copies of both a 35-word abstract and a 500-word summary with a set of figures suitable for journal publication (glossy photographs or original line drawings) should be sent by Jan. 2 to Optical Society of America, IOEC X, Suite 620, 2000 L St., N.W., Washington, D.C. 20036.

FIFTH INTERNATIONAL USERS CONFERENCE, Boston, Mass., May 5, 1978.

The Adabas user who gives the best formal presentation will receive a \$500 reward. Informal presentations are also welcome.

If you are interested in making either a formal or informal presentation, contact Rob Macmillan, President of Adagroup at Simon Fraser University or Tom Berliford at Software AG, 11800 Sunrise Valley Drive, Reston, Va. 22091, (703) 860-5050, before Jan. 15.

TRENDS AND APPLICATIONS 1978: DISTRIBUTED PROCESSING, Gaithersburg, Md., May 18, 1978.

Papers should describe practical experiences with distributed processing or those that present new research results. Topic areas include networks of processors, interprocess communication, security, performance evaluation and novel applications.

Three copies of a 1,000-word abstract should be sent by Jan. 15 to Dr. Ashok Agrawala, Program Chairperson, Department of Computer Science, University of Maryland, College Park, Md. 20742.

1978 MICROWAVE POWER TUBE CONFERENCE, Naval Postgraduate School, Monterey, Calif., May 13-15, 1978.

The objective will be to maintain lines of open discussion between tube manufacturers, systems manufacturers using tubes, and the Department of Defense. Papers are requested particularly in the area of ECM, radar, tube technology, millimeter waves and communications. They should describe either problems, new solutions or applications. To promote free expression of views, no proceedings are published, and photography or direct recording is not allowed.

Ten copies of an abstract appropriate to a 20-minute paper should be sent by Feb. 1, to Leonard H. Klein, Secretary, 1978 Microwave Power Tube Conference, Palisades Institute for Research Services, Inc., 9th Floor, 201 Varick St., New York, N.Y. 10014.

SIMULATION, MODELLING AND DECISION IN ENERGY SYSTEMS, Montreal, Canada, June 1-2, 1978.

Energy systems include electrical, oil and gas, nuclear, coal, solar hydrogen, wind, water and tidal systems. Topics include methodology, forecasting, environmental impact, selection, exploration, transportation, storage, financing and applications.

Three copies of a 200-250 word abstract should be submitted by Feb. 1 to Dr. M.B. Carver, Atomic Energy of Canada, Chalk River, Ontario, Canada K0J 1J0.

MINI- AND MICROCOMPUTERS AND THEIR APPLICATIONS — MIMI '78, Zurich, Switzerland, June 12-15, 1978.

All aspects of mini, micro, modular and meta computers and their applications will be covered, including hardware, software, technology, education, peripheral devices, personal and home computers and instrumentation.

Three copies of a 200- to 250-word abstract should be submitted by Feb. 1 to Secretariat MIMI '78, Interconvention, c/o Swissair Postfach, 8058 Zurich, Switzerland.

FIRST INTERNATIONAL SYMPOSIUM AND EXHIBITION ON COMPUTERS IN BANKING, Zurich, Switzerland, June 13-15, 1978.

Topics covered will include customer-activated terminals, point-of-sale applications, the automated branch, security, privacy, preauthorized payments, banking in developing countries and organization for regional banking.

Three copies of a 200- to 250-word abstract should be submitted by March 1 to Secretariat, Computers in Banking, Interconvention, c/o Swissair, Postfach, CH-8058 Zurich, Switzerland.

## Calendar

Dec. 14-15, Milwaukee, Wis. — Computer Graphics '77, sponsored by Jerusalem Systems. Contact: Jerusalem Systems, Computer Graphics '77, 12201 W. Burleigh Road, Wauwatosa, Wis. 53222.

Jan. 8-11, San Diego, Calif. — OCR Users Association Conference. Contact: OCR Users Association, 10 Banta Place, Hackensack, N.J. 07601.

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## Basic Steps Prescribed To Guide Planning Information Systems

By Jeffry Beeler  
CW Staff

WASHINGTON, D.C. — Since no two users have exactly the same DP needs, no one can prescribe a universal set of guidelines for planning an information system.

On the other hand, by heeding a few general pointers, users can eliminate at least some of the pitfalls they might otherwise encounter in implementing or upgrading such a system, according to John V. Soden, a principal of McKinsey & Co. in New York City.

Soden outlined some of the most important of those pointers at a recent conference here.

First, he advised users to survey their existing information systems. In this procedure, they should first assess the strengths, weaknesses and opportunities of their current markets, technology and products, he said.

Then they should identify their company's most important business problem or goal and determine the firm's strategy for solving that problem or meeting that goal, he advised.

Next, users should set the managerial and technical policies that will govern how their prospective information systems will be organized, funded and allocated among their various departments, Soden said.

Finally, they should try to find out — by ethical means only — who their competitors are. One way of doing this is to interview the competitors' former employees, he suggested.

### Conceptualize System

In the second planning step, users should conceptualize their intended information systems. This task should concentrate on ensuring that DP department plans dovetail with the goals of the company as a whole, Soden said.

Soden warned users, however, against letting the second planning phase become an end in itself.

Third, users should determine the potential value of their prospective information system to their various network members. The advice of an impartial and qualified third party should prove helpful in this regard, Soden explained.

In the fourth planning phase, users should define a plan to implement their target systems. In so doing, however, they must consider all alternative implementation schemes and make sure they

present these options to management in a language it understands, he said.

Finally, companies that want to install an information system should try to gain as much internal support as possible for their implementation plans, he added.

MONTVALE, N.J. — A steering committee, headed by Stephen W. Miller of SRI International, has been selected for the 1978 National Computer Conference (NCC) to be held June 5-8 in Anaheim, Calif.

Members of the committee include Dr. Leonard Y. Liu of the IBM Research Laboratory; Dr. Sakti P. Ghosh, IBM Corp.; David Brandin, SRI International; Richard A. Marciano, SRI International; and others

who will preside over the various sessions, exhibits, contests and special events.

The Personal Computing Festival, which will be presented concurrently with NCC, is also under the jurisdiction of the committee.

The '78 NCC is expected to draw a total attendance in excess of 30,000 with approximately 350 organizations participating in the exhibit program, according to a spokesman for the conference.

## Steering Committee Named For '78 NCC in Anaheim

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# Editorials

## Paper Tiger

Honeywell Information Systems, Inc. claims its new Level 68/Distributed Processing System (68/DPS) is faster than the IBM 3033, but users better not be too fast in believing that claim since the firm refuses to support it with any hard technical data.

In fact, it appears the firm is offering only a "paper tiger" at this time.

Basically, HIS has reconfigured some of the units in its older Level 68 line of large-scale computers and lashed them together with old software.

There is almost nothing new in its redesign of the system despite the claims made by the manufacturer — or at least there is nothing new that can be seen.

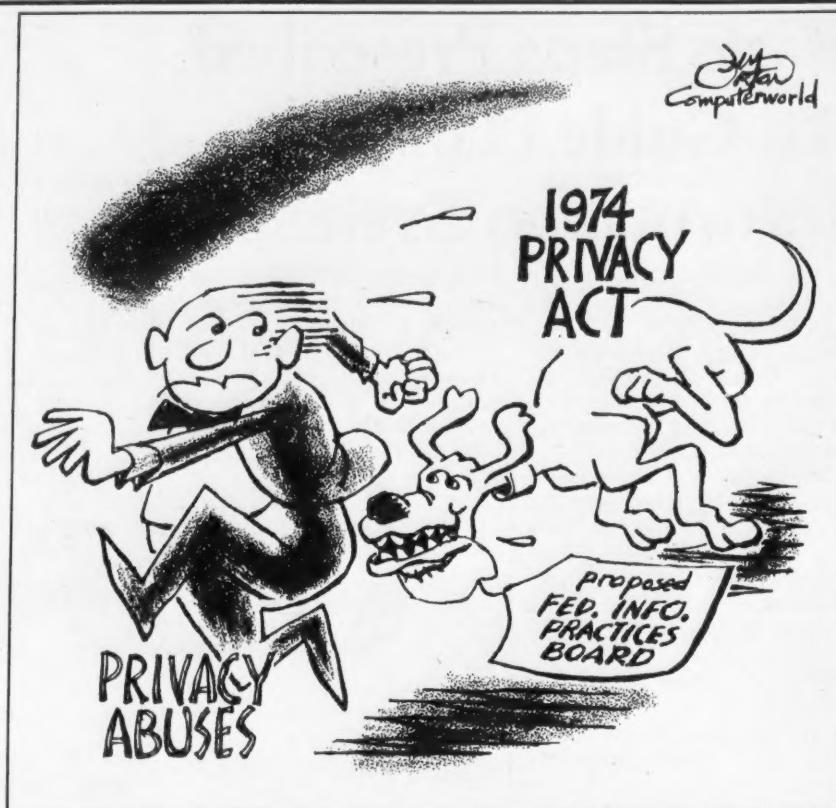
HIS says the system ranges in

power from 25% above the level of the IBM 3031 to 25% above the power of the 3033 at prices that are competitive. But if users are going to believe this, they have to do so strictly as an act of faith.

HIS apparently does not even know itself what the system will do. On announcement of the line of systems, it refused to give out cycle times, clock speeds, memory access times, throughput or benchmark data to support its extravagant claims.

Without such data, users are left completely in the dark about the systems' real capabilities.

With all of its recent fumbling in the large systems market, HIS is probably confused itself.



## Matching Conflicts

The Department of Health, Education and Welfare (HEW) program that uses computers to match the names of welfare recipients with names on the government payroll [CW, Nov. 21] once again points out how conflicts can arise out of the use of information.

The program was designed to detect welfare fraud and therefore keep down welfare costs. At the same time, however, it raises serious questions about the privacy and confidentiality of records.

Eliminating welfare fraud is obviously a good idea. But so is privacy.

Furthermore, the program raises questions about the rights of the state vis-a-vis the rights of an individual. The state has a right to eliminate waste in its welfare pro-

grams, but the individual has a right to privacy of his records.

In this case the state is clearly willing to sacrifice the rights of the individual in order to make its operations more efficient and effective.

While no one can argue that welfare fraud should not be eliminated, individual rights should not be sacrificed to that goal.

When a person gives a governmental body information for one purpose, it should not be used for other purposes. Once the door is open for matching such records — even in a good cause like detecting welfare cheats — it will be easier and easier for the government to match records for less worthwhile purposes.

## Letters to the Editor

### Get Ready for Rewrite

Philip Kraft, author of *Programmers and Managers* [CW, Nov. 14], obviously never had to debug or modify someone else's program, nor did he bother to interview the unlucky programmer assigned to a program maintenance group whose sole purpose in life is to determine what a creative genius meant by — ADD DICK TO JANE, JUMP TO JACK.

Kraft also has never tried to follow the unstructured, unrelated, 300 or more rambling sentences of some paranoid, schizophrenic "genius" whose only reason for not being institutionalized is because he bears the title of "programmer."

This could go on and on, but I suggest Kraft pursue either one of the above and then get ready for a rewrite of *Programmers and Managers*.

David L. Green

Dayton, Ohio

### No Solace From Webster

The feature that inferred me to be among those whom Philip Kraft labeled as "marginal people" drove me, seeking solace, to my Webster's *Seventh New Collegiate Dictionary*.

This further depreciated my fast-ebbing self-esteem as I imbibed of the following definition for "marginal": "3: located at the fringe of consciousness" and "4a: close to the lower limit of qualification or acceptability" . . . moan!

Definition 2b(2) seemed to offer the only hope.

On another article in the same issue, "Training Program for Inmates 10 Years Old," in the accompanying photographs they all looked older.

Peter Kushkowsky

Haddam, Conn.

### Could Univac Really Deliver?

I personally cannot let go unchallenged the article "County Revokes OK of Sole-Source IBM Order"

[CW, Nov. 14]. It is obvious it was written entirely from information supplied by Univac representatives.

The article contains misinformation and misleading insinuations. It infers that Univac is the White Knight to the rescue and that DP Director John Veon's staff is a bunch of incompetents.

I assure you this is not true. Originally we explored every viable alternative solution to our computer needs and arrived at the conclusion that with our particular set of circumstances, IBM 370/158 equipment and software offered the best present solution, with necessary reserve capacity and upward expansion capabilities.

One among many considerations was that while the 95% conversion factor cited by most manufacturers may seem favorable, when applied to our approximately 1,000 application programs and necessary time restriction, it becomes intolerable.

Because of space restrictions, we cannot run parallel equipment. Old equipment must be moved out and the new moved in and running within a three-day weekend.

I also question whether the Univac 90/80 has completely the same capabilities and upward expansion as the IBM 370/158. However, we could probably afford the great deal of extra conversion time and expense if Univac could truly deliver equipment comparable to an IBM 370/158 for \$1.7 million less than IBM's quote of \$2.1 million.

Sidney J. Ketchum  
Assistant Systems and  
Programming Supervisor  
Data Processing Department  
Kern County  
Bakersfield, Calif.

Computerworld welcomes comments from its readers. Letters should be addressed to: Editor, Computerworld, 797 Washington St., Newton, Mass. 02160.

## Data Past

### Five Years Ago

Nov. 29, 1972

**WASHINGTON, D.C.** — The Supreme Court, in a unanimous decision, ruled that some computer software is not patentable. The court held that some programs are essentially ideas and that "it is conceded that one may not patent an idea" as would have been the case if the patent in question (Benson-Tabot) had been allowed to stand.

**DENVER** — The Colorado Supreme Court barred the compilation of arrest records on persons never convicted of crimes. The move made it illegal for police agencies to store or transmit criminal history information or rap sheets on persons arrested for criminal acts but never convicted.

### Eight Years Ago

Dec. 3, 1969

**MIDLAND, Mich.** — More than 1,000 tapes at a Dow Chemical Co. computer center were erased in a

protest against the Vietnam War. Damage estimates ranged up to \$100,000.

A group called Beaver 55 took credit for the damage. A Beaver spokesman said the tapes were used to store data from "research into such areas as nerve gases, napalm, defoliants and other secret chemical weaponry." A Dow spokesman denied the charge.

**WASHINGTON, D.C.** — Social Security Administrator Robert M. Ball said computer programming for an increase in Social Security benefits could not be handled quickly as a practical possibility. Ball explained that converting to a higher level of payments was not a matter of making a simple percentage increase in each present payment.

Ball was replying to a question raised by Rep. James A. Burke of Massachusetts before the House Ways and Means Committee concerning the length of time it would take to provide the proposed raise in Social Security payments.

# Ethics Council: Bright Idea for Dark Ages

By Jack Stone

Special to CW

In a recent column, Alan Taylor provided some significant new information on the DP ethics issue [CW, Oct. 31].

First, he noted that audiences at three rather formidable conferences — SRI International workshop, the National Computer Conference and the Data Processing Management Association Conference — "split" on the question of program ownership which asks whether a programmer has rights to a program "tool" that he develops on his own, using company resources, to do a better job.

Then he discussed a rather intriguing suggestion for an Ethical Standards Council. The idea here is to collect "25 to 50 representatives who would vote anonymously on selected [ethical] questions," either as a body or as groups of seven to nine members, and "then have their voting records published."

As I have strong views on the matter, I decided to enter the controversy via critical commentary in my next column. But because the hour was late or because the Redskins played miserably against the Giants or because I was benumbed by the electrifying discussions of DP ethics in the trade press, I chose to catch 40 winks before starting to write ...

... The visitor was more than ap-

prehensive as he trudged across the drawbridge. The heavy, oaken door of the castle was opened by a figure dressed in a long white robe and a tall, white, pointed hood.

He was quickly ushered into the Great Hall, which was lit by flaming torches hanging from the ceiling. The Ethics Council members sat in high-backed chairs on a platform against the far wall, perhaps 25 to 50 of the robed, masked figures, huddled loosely in groups of seven to nine. He was directed to sit on a small three-legged stool in front of the Council.

One of the members rose, stepped forward, unfurled the accusatory and decried, "Adam Begonah, data processing manager! You have been accused of immoral, unethical, and ignoble conduct in your computer center.

"You are charged with denying your DP employees their divine rights to produce their own software on company time by terminating their use of the firm's computer for their own product development and restricting their access to the Wats line for marketing their products. What say you?"

Begonah stood and with a strong voice replied, "Mr. Chairman, although I performed the actions you described, I am innocent of wrongdoing. I was only following the ethical standard used by all the other technical professions in

America that states a salaried professional employee cannot engage in any outside activity related to his profession for his own personal gain and all products, inventions, methods, etc. developed by him —

"Blasphemy!" boomed the chairman.

"Blasphemy!" echoed the Council members.

The questioning continued. "But can't you see that when a programmer takes the initiative to develop a 'tool' which helps him to be more efficient, he is actually helping the company and, assuming the development was not specified by the company, his unsolicited efforts merit his full ownership rights to the 'tool'?"

"No. The standard still applies. The company owns the tool. The salary is intended to compensate for these ideas. The true professional is expected to develop tools, systems, procedures and methods that will enable him to do a better job, all of which are rightfully owned by the employer. Further, if the tool is deemed to have particular value, the employee is ethically bound to notify the company of its existence."

"Notify the company?" the chairman shouted.

"To the stake! On to the stake!" roared the Council members ...

I woke up in a cold sweat and quickly decided to switch the subject of my next column to a strictly noncontroversial topic.

Letters to Stone should be addressed to him at Suite 222, 2233 Wisconsin Ave. N.W., Washington, D.C. 20007.

## The Human Connection

on or off the premises — are the property of the employer."

"Heresy!" screeched the chairman.

"Heresy!" echoed the Council members.

The chairman began the inquisition: "Don't you understand that DPers are not part of the humdrum mainstream of U.S. technologists, but a superlative breed apart and merit the heaven-sent privilege of pursuing outside interests using company resources?"

Begonah's voice did not waver. "The standard is based on the proper notion that any outside activity represents a potential conflict of interest in which business opportunities could be siphoned away from the firm and channeled into the employee's pocketbook. If the employee wants the extra DP income, he should form his own company and face the same business risks as his current employer."

## DPers May Soon Face Era of Malpractice

The prototype of the professional DPer's responsibility — and the extent of it — was shown last week to be analogous to that of an architect, rather than that of a doctor. In the New York trial of F. & M. Schaefer Brewing Corp. vs. Electronic Data Systems Corp., Federal Judge Constance B. Motley made this distinction. This is important, because the profession has long been grasping for the privileges of doctors and auditors as being the hallmarks of professionalism.

Doctors' privileges arose from the nature and maturity of their profession and auditors' privileges arose from society's need for independent second opinions on accounting matters.

Architects, however, have none of the doctor's privileges and few of the characteristics of auditors, but they have a special relationship with those outside their profession, a relationship that puts them on notice that they must perform their architectural duties correctly — or else.

In deciding that the complexities of the DP operation and language can plausibly constitute a similar special relationship, Judge Motley also indicated that such responsibility might well last for many

years after the actual "malpractice" took place.

### Years of Responsibility

This is because of a doctrine called "continuous treatment," which in the case of accountants seems to mean that a client isn't expected to constantly call for second opinions from other accountants; the same holds true for architects — at least as long as a single job is going on.

Thus, if a mistake is made at the beginning of a contract, but is not discovered until well after its completion (the contract may itself last three or four years) the Statute of Limitations doesn't bar the victim from being able to get some relief for the faulty building, or whatever.

All of this adds up to a revolution in DP responsibility and apparently in DP practice — or malpractice, perhaps. It's rather like the time when the germ theory of medicine became officially accepted and anyone found not sterilizing the scalpel became liable to be kicked out of the profession. The whole previous power of the witch-doctor to blame failures on incorrect incantations — or upon the fact that the luckless lover kicked a black cat on the way to deliver the fatal love potion — went out the window when germs became understood.

In the case of the architect, if a girder is the wrong type to carry the load, then the fact that it is shown in a diagram of the building which has been signed off by the client makes no difference to the cause of the

building failure. It is the architect's special relationship with his lay client that makes him responsible for the incorrect beams, and it is now our professions' responsibility to find something that affords the public the same type of professional protection that strain analysis methods and sterilization techniques give the clients of architects and doctors.

Just what this protection will be we don't know. And because of the method of justice practiced here in the oldest, most densely populated automated country in the world, it is unlikely that we will find out beforehand. Cases are still being heard that involve the events of 1968 and 1969 and a similar lag can be expected to continue.

The only way we could know ahead what is regarded as being sufficient would be through Congress' passing some sort of law which sets us up with legal monopoly and duties — a licensing technique, perhaps. As readers of Computerworld well know, that is something the profession will fight to avoid.

This is not a very satisfactory method. It might well frighten those who would offer computer malpractice insurance (who can no longer rely on contract provisions always being able to limit the damage to a trivial amount). Still, with the profession as powerful as it is, and as young as it is, it seems inevitable that this situation will continue for some time yet.

Probably the first system-design

malpractice insurance will have to come from technically strong groups who will hopefully be able to cut through the technical and legal forests and so be able to somewhat reduce the presently astronomical litigation costs. (If anyone has any suggestions or knowledge as to where this is being considered or being performed, please write to me so that we can all know.)

### International Idea?

The beauty of the Motley analogy is that it seems right. The relationship between the legal duties and client relationships of architects and system designers is so easily understood by outsiders that I feel that it will catch on.

It is not original in itself, of course. But this is the first time that I know of where it has been the basis for a legal decision, in this case that the relationship permits the continuing treatment doctrine to apply.

The days of the "witch doctor" analyst are not yet over, I am afraid, but they are numbered. The future may not be so romantic but it will protect those who work properly and throw out those who don't. And that is a very great advance.

(Please note that there is no copyright on this article, nor will there be on any future articles that deal with this subject. Please reprint and distribute them freely. Disagree if you wish, but don't ignore the fact that things have changed with the recognition of professional responsibilities that now exists.)

# Software Builder's Dilemma: Spec Changes

By Miles Benson

Special to CW

It's not often software technologies have to keep a "Pearl Harbor File." But the one Marty Whipple kept may've been the smartest political move of his

career.

Not only that, but it became a significant factor in his management's understanding of the Software Builder's Dilemma, circa the 1970s.

To get this story underway, let me define a term or two. A "Pearl Harbor File" is a historical record of a series of interrelated

events, created because the author believes he may need it for self-defense someday.

"Marty Whipple" is the pseudonym for a systems analyst at the mythical firm of Second Growth Lumber Co., down in the hypothetical community of Drawl, Ala. (across the state line from the somewhat less hypothetical town of Plains, Ga.).

And the Software Builder's Dilemma is the complaint, spoken more loudly and in more anguished tones as the years go by, that software is too expensive, too complex and too unschedulable, while at the same time its users impose more and more tricky requirements on it.

## Getting Down to Specifics

But let's get down to cases. Marty Whipple smelled a rodent from the very beginning of the Second Growth Measurements in the Field Research Project. Conceptually, measuring tree growth in real time to determine the impact of various growth factors was a nifty task. Some of the problems pushed the state of the art a little, but in challenging rather than threatening ways.

It was the people Marty was dealing with that caused his panic button to twitch nervously. Frank Crenshaw knew tree farming about as well as anybody in the country, but inside Second Growth he had a reputation for pinching pennies and blaming others for his mistakes.

And Earnest Cottonwood was a sharp manager, but driven by an ambition so aggressive that some people said that he burned his bridges before he crossed them.

Marty could see the handwriting on the stump from the beginning of the project, and early on he labeled a file "historic background" and kept it up to date with every new policy decision.

In fact, this story might best be told by just lifting some excerpts from Marty's file. Fortunately, he wrote it like a diary, so it reads fairly well. And who can resist the temptation to read someone else's diary?

"Feb. 20: Crenshaw and Cottonwood have a terrific idea — a set of experimental tree growth plots, each with its own computer in the field, measuring various growth factors to scientifically determine their impact.

"The payoff is that the company stands to improve

its tree farming techniques. The problem is that it doesn't know beans about computers. I'm assigned to educate everyone.

"Feb. 27: The more I look, the better I like it. There are too many old wives' tales in our field. Crenshaw and Cottonwood want to get some scientific data to prove or disprove them. And a computer appears to be the hub of the job.

"I only wish C and C understood some of the implications of what they're doing from a software point of view.

"March 12: 'C and C' opted for the 'Keep It Simple, Stupid' Approach — but only for the hardware. This job needs at least a 32K Quadranova mini with ruggedized components to fight off the environmental elements.

"C and C are only willing to buy a 4K Marketronics box with commercial components because they're planning on ten widely scattered test plots and they want to hold the costs down. "Besides, the Marketronics rep told them it'd do the job. I see trouble ahead.

"April 4: Top corporate brass gave C and C the go-ahead for the project. Unfortunately, they only requested funding for the Marketronics computer. Now the software fat's in the fire.

"May 16: This job is about three times as hard as it should be. The software has to be folded into the machine in overlays because of the small core.

"But the overlay mechanism is expensive, and all of a sudden I'm not sure that the Marketronics is fast enough to do its real-time chores and keep up with overlay management. Sizing problems beget timing problems.

"June 4: Had to scrap all hope of using a high-level language today. C and C don't like it. I convinced them earlier that it would lead to a more maintainable code, but high-level code was running 37% less efficient than Assembler, and I haven't got 37% to throw away.

"July 23: I was about three-fourths through coding when C and C changed the experiment design. Fortunately, I coded in a pretty modular way, but still there's major impact on my software design. This project is getting to be less fun every day.

"Aug. 1: Crenshaw told me today I was well over budget on software implementation. He is also beginning to see at least a six-

month slide in the schedule for first data acquisition, and he says it's my fault.

"It wasn't the time to hit me with that. I was still redesigning from his experiment change, and my temper was already as taut as a choke collar on a frisky puppy.

"I told him where he could stick his instrumentation. Fortunately, we ironed it out. No, smoothed it over would be more accurate.

"Sept. 16: The program can run some test data, but it's sure a kluge. Maintainability is shot, both because of the changes and because only really tricky coding would get the job in core. Now for the field tests.

"Oct. 1: The field tests failed miserably. I know it's the commercial hardware — the Marketronics just isn't rugged enough to withstand dew and 40 temperatures — but C and C blame me.

"It couldn't be the hardware, they say — not with 4,000 others in the field and working successfully. (Bet that argument came straight from the marketing rep.) Voila — it must be the software.

"I'm spending more time on self-defense than I am on working the problem.

"Oct. 8: Finally proved my point. Ran the field tests in the lab and they worked. Crenshaw tried to hush my findings, but I was too mad to be muzzled. Top brass is going to hear about this.

"Oct. 12: Top brass didn't care. 'Hardware, software, it's all the same,' they said. 'We don't care who's at fault, just get the job done. Or we scrap the project.'

"Nov. 28: Worked Thanksgiving weekend to finish field checkout. C and C's idea of a protective structure around the Marketronics for environmental control worked, but it cost a fortune. The Quadranova would've been cheaper.

"But anyway, we're on the air. Over budget, behind schedule and with a shabby product.

"Dec. 15: C and C did it, just like I knew they would all along. 'The software was at fault,' they told the brass. 'Otherwise, we'd have been on the air long ago.' Time to fire my guns, I guess.

"Jan. 4: The series of meetings with management was worthwhile. For the first time, I think they're beginning to understand software.

"Sure, I was over budget and off schedule. Good old flexible software, let it solve all the problems no one else can solve.

(Continued on Page 18)

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# Freed to Sherin: Know the Rules of Law or Get a Lawyer . . .

By Roy N. Freed

Special to CW

Morgan Huff of Nashville wrote a plaintive letter [CW, Nov. 7] about how Bob Sherin got short shrift from a federal court recently. Sherin challenged as unconstitutional the recent action of the Tennessee legislature in subjecting software transactions to its sales tax after its Supreme Court wisely ruled they were not covered by the then-current scope of the law that taxed transfers of tangible personal property.

Huff and Sherin deserve our sympathy, not because they are offended by the federal court's failure to find the Tennessee legislature's action illegal, but rather because they were willing to try to understand the entirely reasonable rule of law

that applies to the case.

There is no substitute for knowing what the law is. It saves lots of

including imposing all sorts of taxes.

Despite gratuitous and gratis legal

government and our society. They apply to people in the computer industry as well as to those in other activities.

There is no substitute for knowing the rules of law in conducting business activities, which includes structuring transactions, creating agreement forms, conducting negotiations, identifying tax liabilities, selecting measures for protecting proprietary software programs and assessing and treating tort liability exposures.

If you ignore the rules of law in operating your own business, you subject yourself to financial harm. If you do so in conducting someone else's business, your are unprofessional at the least and possibly even irresponsible.

The apparent mystique of computer technology seems to have

(Continued on Page 22)

## Reader Commentary

wasted energy, emotional unhappiness and the court's valuable time.

Shering had a piece in *Computerworld* characterizing the Tennessee legislation as unconstitutional. I presumed to respond in *Computerworld* that it might be stupid, but it wasn't unconstitutional.

It is a fundamental principle that, in the exercise of the very broad police power, legislatures properly may take a wide variety of actions,

advice, Sherin plunged ahead, acting on his own behalf. I doubt he could have found many lawyers who would see any merit in the case; the results that troubled Morgan Huff were a foregone conclusion.

### The Lesson Learned

What is the lesson from this incident? There is a large body of legal rules that have been developed over the years for our system of

## . . . Lawyers, Laymen Can Join Forces

By Rober M. Sherin

Special to CW

Roy Freed's analysis of my case in federal court against a Tennessee statute taxing software (Sherin vs. Tennessee) echoes the position of the defendant Tennessee.

His numerous characterizations of Morgan Huff and me create an aura — at least to me — that lawyers have a monopoly on wisdom. While Freed's opinion on the case, consistent with Tennessee's, does not merit our close consideration, his characterizations do not.

In the case two issues have arisen. The first is whether the due process and equal protection clauses of the Fourteenth Amendment bar the Tennessee legislature from classifying software as tangible in the face of the earlier Tennessee Supreme Court decision finding software intangible.

The second question is whether the Tennessee remedy of payment of the tax and a suit for a refund is a "plain, speedy and efficient" remedy within the meaning of the federal law; if it is, the federal court will refrain from taking jurisdiction.

On Nov. 15, after a hearing was held on both issues and following the filing of some 300 pages supporting the plaintiff's case, the court handed down an order and a three-page memorandum. Chief Judge L. Clure Morton ruled the Tennessee remedy is adequate and therefore "the court cannot grant [plaintiff] the relief he seeks."

Since there is an overwhelming body of recent case law to the contrary, the plaintiff is appealing the decision to the Sixth U.S. Circuit Court of Appeals in Cincinnati and is optimistic about the outcome.

### Law Not Clean

"The entirely reasonable rule of law that applies to this case" expressed by Freed is clear neither to laymen nor lawyers. When the judge said in open court that a state legislature can call black white, men women and intangible software tangible, Morgan Huff wasn't

the only one astounded.

Although that statement on its face may sound irrational, in the world of jurisprudence the self-evident often assumes epic, mind-searching proportions. After intensive reflection, I believe the judge meant it is of no constitutional significance to the federal court that the legislature may have usurped the Supreme Court's authority, and the burden remains on the plaintiff to prove the alleged usurpation is a violation of the Fourteenth Amendment.

Most laymen understand due process takes time. It is not uncommon for court cases to consume years.

In my efforts against unlawful software taxation before legislative courts representing the Data Processing Management Association (DPMA) and before judicial courts representing myself, I have tried to formulate the issues so as to avoid protracted litigation.

Our Florida victory (6 Computer Law Svc. Reporter 18) took five months. DPMA's participation in the recent New York victory took seven months.

Just as we laymen understand the time it takes lawyers to reach the ends of justice, Freed should be equally tolerant of us laymen.

The need for lawyers and laymen to work together as equals is best exemplified by the industry's recent victory in New York. For over a year lawyers and laymen had expressed differing views concerning the best remedy.

After laymen in DPMA set up the administrative remedy that resulted in the ultimate victory, all of the parties buried their differences and got the case together. The result was colossal and conclusive.

By now it should be apparent that the much feared "retroactive tax scare" is a mirage from which the industry should not cower and abandon the prospective fight. Ultimate victory everywhere requires zealous opposition to both unlawful retroactive and prospective taxation and, time is of the essence.

The forum chosen for the challenge should be as close to the revenue agency as possible, depending on the nature of the adverse ruling. Winning this cause against unlawful taxation demands the best for the industry from lawyers and laymen alike.

Sherin is president of Nova Computing Services, Inc., a Miami service bureau. He also serves as a legislative adviser to DPMA.

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A step-by-step guide to proposal preparation is now helping many computer/EDP firms score big wins in their proposal efforts. Users of the book, entitled *How to Create a Winning Proposal*, report an impressive 42% average increase in the success-ratio of their proposal projects. Of the companies polled, 68% attributed their successful track record to the guidelines provided in the book.

Dubbed "Winning Proposal" shortly after publication, the much-needed volume has rapidly become an international standard guide for use in both government and commercial proposal efforts requiring a high level of sophistication. It covers the entire proposal process from start to finish . . . giving detailed instructions on contents, structure and methods of preparation for solicited as well as unsolicited proposals. Technical, cost and management section checklists are included to ensure the proposal team of covering all the important bases.

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That "Winning Proposal" is effective in proposal preparation is evidenced by its wide use in GSA, DOD, NASA and the military . . . as well as in varying sizes of

national and multi-national corporations. For many project managers, it is a virtual lemonade-stand in the Sahara because of the valuable assistance it provides. All agree that the most outstanding feature of the book is usability. It enables the user to actually plan, write and submit a superior proposal with a high win probability.

*"... a complete guide to planning, writing and submitting a winning proposal."*

Convair Managair Feb. 1977

The authors cover government requirements in an overview of the U.S. procurement network, how it works, and how the proposing firm can increase its effectiveness in competing for contracts. Excellent guidelines are given on how to analyze and respond to RFP's, RFQ's and IFB's. Simplified formulas enable accurate costing-out of engineering, R&D, service, manufacturing and production projects.

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# Inexperience Causes 'Adolescent' Managers

By Ben H. Carter

Special to CW

It's always interesting to read an article about the failings of DP managers like "DP Managers Still in Adolescence: Withington" (CW, Oct. 17).

I don't know the extent of Frederic G. Withington's direct management experience in DP operations, but

many consultants in the DP area have very little real background in the field in terms of actually developing a management information system (MIS) within the corporate environment.

My experience includes 25 years in systems and DP, both as an internal manager of these functions and as a management consultant to

various industry clients. As the result of analyzing company information requirements and their DP operations from various view-

should be processed and what outputs are necessary, with very little conceptual definition and discussion with users in the design

politics and sloppy management techniques.

Again, the resulting conflict is natural when he is forced to interact with the illogical and poor planning so prevalent in the business world.

## Basic Capabilities

Basically, I think that a DP manager must have the following capabilities:

- A good systems and/or programming background and sufficient understanding of what the DP function can and should contribute to the corporate operation.
- Heavy exposure to a variety of functional areas and people; ability to deal with diverse situations.
- A solid approach to planning and executing projects.
- Sufficient strength of character to insist on a well planned approach to DP utilization which provides direct communication with top executive levels in systems development situations.

• Ability to select and direct highly qualified staff members in systems programming and operations.

Business managers, especially in smaller companies need to:

- Improve their basic management and planning methods and reduce the involvement of company politics in decision making.
- Learn what an MIS is and help develop it.

• Select DP managers who know how to manage — and give them the opportunity to do so.

- Support DP as the vital function it should be in a dynamic company.

If DP is properly organized and supported, with the understanding that it is an integral part of the total organization and not a "necessary evil" overhead operation, both general management and DP management can do a more effective job and communicate as members of a team.

Too often, this interaction is one of friction and competition, rather than the collective achievement it should be.

Carter is DP manager at Mastercraft Industries in Denver.

## Reader Commentary

points, I have come to certain conclusions regarding the communications problems which exist between the DP function and corporate management.

Basically, too many DP managers have been moved into their position from a technical background without having the opportunity to gain management experience or without having management ability. This situation produces some of the attitudes and conditions Withington described and is, to a great degree, the fault of management in general.

A high percentage of specifications for DP management job openings include requirements for specific programming background, knowledge of a particular piece of hardware and other technical expertise.

Little, if any, consideration is given to overall management ability.

### Measure of Effectiveness

Actually, a DP manager's effectiveness is determined by his ability to plan and manage his staff and its projects, interact well with all other functional areas of the company and involve himself with overall corporate planning so the future MIS is properly developed and integrated.

DP managers with technical orientations tend to be weak in communications with those in other departments who are not well versed in specific programming and hardware functions. The technician (in his frustration) designs systems to suit his idea of what data

stage.

Also, he does not delegate projects to his staff to the desirable extent, but does most of the work himself, to the exclusion of other DP management requirements.

The second major problem area is the relatively low capability of the average corporate management member to do an effective job within the environment existing in many companies. Politics, lack of management training, provincialism and other basic organizational problems that thrive within middle and top executive levels create serious difficulties in MIS implementation.

In addition, the DP division quite often reports to a second-level department, such as accounting or office services, thus limiting the overall access to major corporate activity areas which require attention.

### Frustrated Technician

Couple these two conditions together and you find highly qualified DP technicians, frustrated by management inaction and indecision, criticizing users, creating conflicts between DP and the organization and often appearing to be "know-it-alls, simplistic, self-centered, too ambitious, incommunicative and arrogant," as Withington described it.

Another factor is the nature of the average DP person. He is normally an individual who has a logical, direct approach to problem solving, plans and documents well, is above average in general intelligence and dislikes company

## Changing Requirements Software Builders' Snag

(Continued from Page 16)

"Well, I think this case history helped clarify a few things. At least, I hope so."

"Feb. 20: I knew it, I knew it. One year to the day from project start, the software bailing wired together, C and C want to introduce two new parameters and a pair of new reports."

"I'll do it, of course. But it's going to be hard. And Slow. And painful."

"When I stop to think about it, Marty's story isn't all that

new. Requirements changes have been a plague on the house of software for at least a decade or two."

But maybe, just maybe, Marty's Pearl Harbor File may have opened the door to management's understanding why that new change is going to take as long and cost as much as it will.

Because if they don't, the Software Builder's Dilemma can only get worse.



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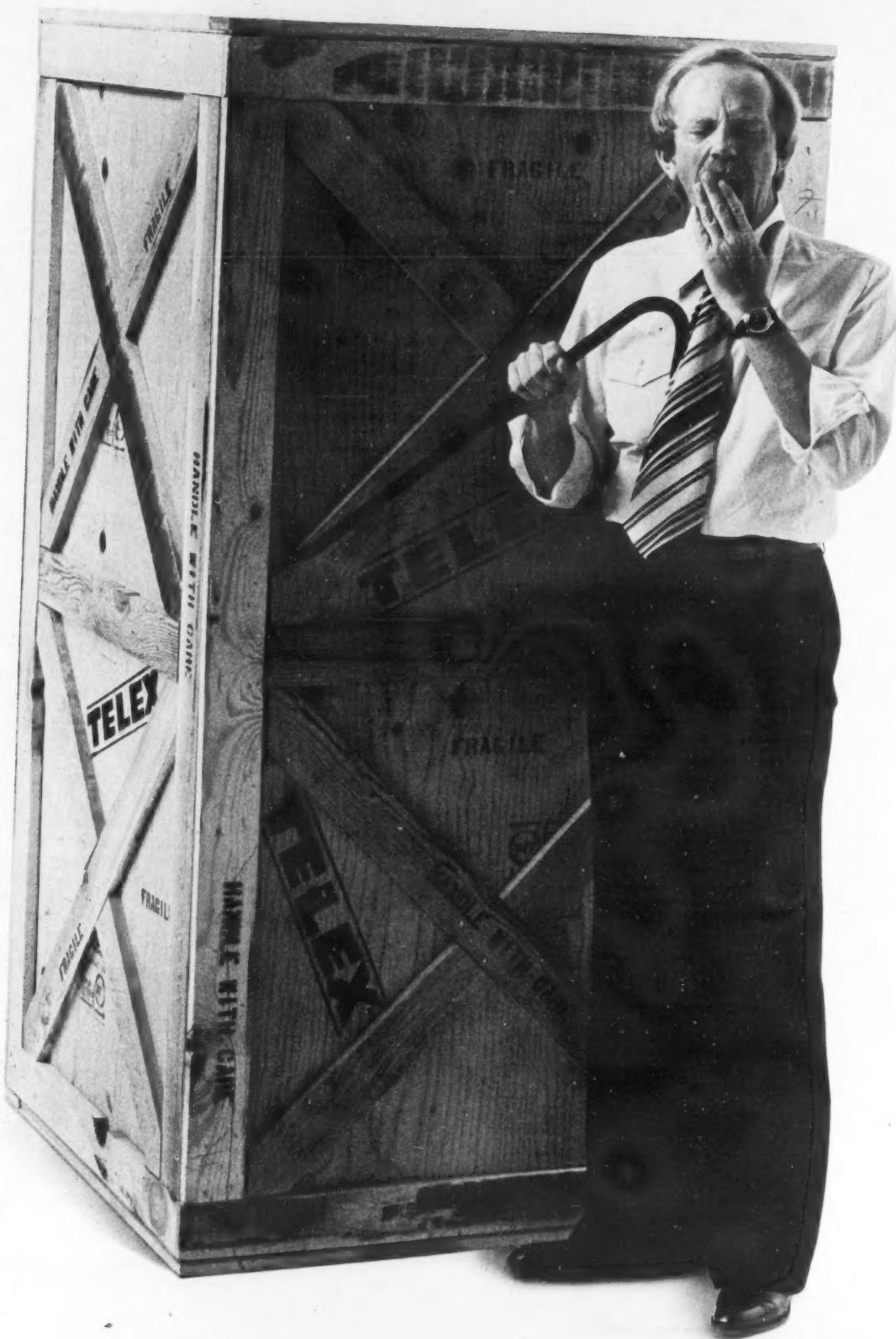
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# Engineering breakthroughs enable Telex to bring big computer storage and reliability to OEMs at a fraction of the size and cost.

The long-awaited 6250 bit-per-inch (bpi) tape drive for minicomputers is here.

## The Telex Model 6250.

It offers minicomputer users nearly four times the tape capacity of the previous 1600 bpi drives. Yet it takes up only one-fourth the space and costs only about half as much as the worldwide accepted, big box 6250 bpi units Telex has supplied to IBM users for years.

## The four-to-one size reduction wasn't easy.

It took three years and a whole new standard of design to pack all that technology in a 19-inch frame. Parts innovations. Creative placement of needed elements. New materials. All have led to a remarkable achievement in simplicity and reliability.

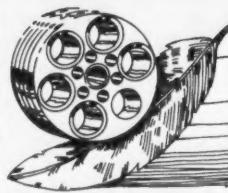
The machine meets all the stringent requirements of true high density, 0.3-inch inter-record gap recording in both read and write operations.

### In addition, the drive:

- Handles all three standard data formats—NRZI, PE and the new GCR.
- Runs reliably at speeds to 125 inches per second (models are also available at 45, 75 and 100 ips).
- Transfers data at the high speed of 781 kB per second (so off-loading can be done at nearly disk speeds).
- Rewinds a full 2400-foot tape reel in less than a minute. (That's 500 inches per second!)
- Reduces the complexity and cost of field maintenance (all work is done from the front).

## Remarkable new capstan weighs only 1.9 grams.

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Not only does its lack of weight reduce inertia, it lets us use a smaller motor. Heat is reduced. Cooling blowers and hoses are eliminated.

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## Telex tape path gets you up to speed in a hurry.

Perhaps the most dramatic example of how Telex miniaturized the 6250 is its tape path\*. The path is very compact, yet it retains four vacuum columns (just like big brother).

It brings new efficiencies in tape dynamics and reduces the length of tape required between head and primary vacuum columns.

Combined with our new capstan, friction and mass are cut down so much that the unit runs tape full speed forward to full speed reverse in a mere 0.13 inches (a new record).

Special vacuum buffers and fixed air bearings gently handle tape at the high program rates possible with short inter-record gap operation. They eliminate long spans of unsupported tape, thus avoiding harmful tape oscillations that can restrict programming.

And we're so confident of tape servo reliability that we covered up the tape path with the operator's panel (further reducing space requirements).



## New controller/formatter handles up to eight drives.

It includes the same proven logic design as our big controller, only miniaturized to fit a 10 1/2-inch-high, rack-mounted box. And it's flexible enough to intermix all four tape speeds and all three densities—800, 1600 and 6250 bpi—in the same subsystem.

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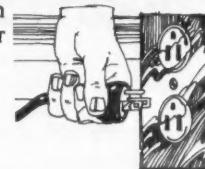
Given on-hand parts, a disabled machine should take less than an hour to fix. And all maintenance is done from the front.

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Design innovations with a goal of simplicity have enabled Telex to bring OEMs this remarkable new tape transport and controller. Large minicomputer users need this 6250 bpi mass storage capacity. Models are available now in dual density 800/1600 bpi. Full 1600/6250 bpi units will ship in the first quarter of 1978. Be the first to offer it.

Write or call Mr. Dan O'Neill, Telex Computer Products, Inc., 6422 E. 41st Street, Tulsa, Oklahoma 74135. Telephone: (918) 627-1111.



\* patent pending

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## Not Necessarily So

Lee R. Prescott's letter ("Dispersing Incompetence," CW, Nov. 21) compels me to comment on the Nov. 7 issue's coverage of my remarks at the Munich Systems 77 conference ("Lecht: Dispersing DP Means Distributing Incompetence"). I did, in fact, make the point that distributed data processing can result in dispersed incompetence [as opposed to the contained incompetence that may characterize a centralized EDP site]. However, I do not believe this is a necessary consequence of employing distributed systems. Indeed, that DDP can be beneficial is inarguable, in my view.

Prescott's letter assumes IBM's distribution scenario; this is borne out by his references to "the central staff of designers and programmers" and "the large central host complex." This language does not imply recognition of the new, now commonly accepted notion of distribution of systems control espoused by most of the other manufacturers: rather, it suggests

## Letters to the Editor

that DDP merely involves a better distribution of today's systems hardware resources.

The Norris (Control Data Corp.) notion of DDP, which involves the possibility of distribution of control of the network from one site to another, with all that implies, more fully describes the DDP concept.

The Systems 77 coverage indicated that I think IBM is, in some way, resisting DDP. I do not believe I said this. What I did say is that IBM's posture with respect to continued single processor centralization of network control suggests that its concept of DDP is less flexible than that being entertained by most of the other manufacturers.

Prescott's description of DDP (which coincides with IBM's), subsumes a hierarchically organized network containing a single, controlling "mother" processor. We wonder if a major motivation for this DDP scenario may be found in

recent industry conclusion that, even if all the software and hardware necessary to manage DDP according to its widest definition were available, increasing shortages of technically skilled personnel would make it less attractive to attempt. Or is it motivated by the lack of a clearly defined IBM product?

In any event, I never predicted an early demise of DDP as such. What I did say is that the "imperial" deployment of DP envisioned by IBM and the "proletarian" deployment seen by CDC were restatements of an old argument between centralization and decentralization — an argument without simple resolution.

Charles P. Lecht

New York, N.Y.

### Cobol Verb Suggested

I would like to suggest that a new Cobol verb be established to be used for setting a level 88 condition name. For example:

```
05 MARITAL-STATUS-FLAG PICTURE 99.
 88 STATUS-IS-MARRIED VALUE 0 THRU 9.
 88 STATUS-IS-SINGLE VALUE 1.
```

Current procedure allows the flag to be checked with a straightforward "IF STATUS-IS-MARRIED ...," but requires "MOVE 0 TO MARITAL-STATUS-FLAG" to

specify the condition.

The only way to determine what a 0 in this field means is to refer to the field definition in the Data Division. If a new verb, "SPECIFY," for example, were established, the "MOVE ..." statement could be written "SPECIFY STATUS-IS-MARRIED." This seems to me to be much more meaningful and certainly more in keeping with the "readability" of Cobol.

In order to accommodate multiple values for a condition name, a "WITH" clause could be used to indicate the specific value. For example:

```
05 MARITAL-STATUS-FLAG PICTURE 99.
 88 STATUS-IS-MARRIED VALUE 0 THRU 9.
 88 STATUS-IS-SINGLE VALUE 1.
```

Ket Watters  
San Francisco, Calif.

### Major Inhibiting Factors

In reference to the article "DP Can Aid Society and Vice Versa" [CW, Oct. 24], I am very definite in my conclusion that the current state of the art in computers is inhibiting the proper, acceptable and widespread use of computers. This obstacle mainly concerns the engineering and hardware technology of computers and systems. I cannot imagine revolutionary and advantageous widespread uses of computers in the world market without breakthroughs in engineering and software technology.

Subhash C. Bakshi  
Branch Hill, Ohio

## Terminal response time diagnosis.

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## Lawyers Can Join Laymen

(Continued from Page 17)  
dazzled or distracted many participants in the industry in many ways. One way has been to deter them from seeking sound legal advice.

That is indeed a pity because the technology represents a major technological revolution and merits wise attention to its legal ramifications promptly and constantly to avoid the adverse consequences of oversight.

We haven't even begun to identify important legal aspects of the technology. That is indeed a pity because we have a unique opportunity with our awareness of the significance of the phenomenon.

Responsible computer professionals should demand legal attention to their activities, technology and industry at a level commensurate with its significance. They should avoid being distracted by futile tilting at windmills.

As far as sales taxes are concerned, the important task is to create a genuine understanding of the natures of the wide variety of transactions in the computer industry so sales tax administrators can determine whether they are covered by existing tax structures and so legislatures can adopt intelligently formulated new statutes when they want to expand the laws to cover the new types of transactions of the computer age.

Freed is a Boston attorney.

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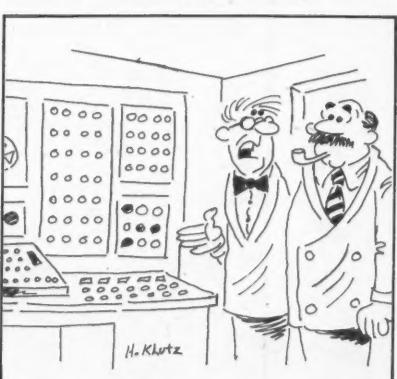
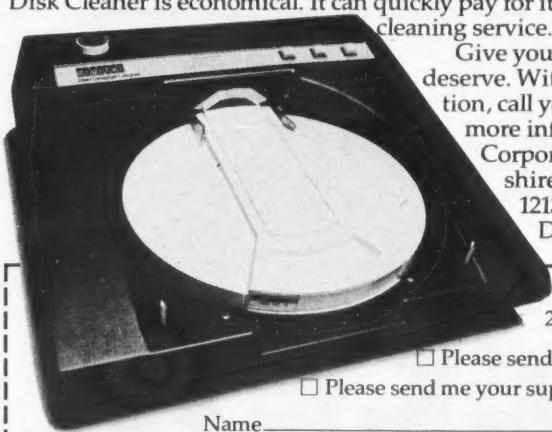
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'There's Nothing the JRT-7065 Can't Solve But It Did Have Trouble With Last Week's N.F.L. Predictions ...'

# SOFTWARE & SERVICES

## 'Mark IV' Easier to Use, Efficiency Up

By Don Leavitt

CW Staff

CANOGA PARK, Calif. — Enhancements built into Release 7 of Mark IV now being distributed by Informatics, Inc. make this update the most significant in the product's history, in the view of one company spokesman.

Mark IV is a general-purpose software system for the design, implementation and operation of DP applications. Developed to replace Cobol and PL/I, it provides users with more structure than those languages but less than RPG, the spokesman noted.

The Release 7 changes affect the system's ease of use, its efficiency, the support it provides to transaction processing and the data base management systems

with which it interfaces.

The system has been adapted to additional operating environments and special features due out shortly will handle queries through IBM's CICS or Informatics' Intercomm teleprocessing monitors, the spokesman said.

### Added Flexibility

To add flexibility, the capabilities providing source statement retrieval have been fully integrated into the Mark IV maintenance routines, he stated. Although the system will show when reorganization might be advisable, the "when" and "how" of the reorganization is still the responsibility of the user, he added.

To work temporarily with a variation of an existing file, users

have been provided with a key field override facility. A new key can be specified and used throughout the run without physically reordering the records.

A grand summary override now allows users to block the printout of grand total figures that are accumulated by the system but which are not always meaningful to the using organization, according to the spokesman.

To enhance the efficiency of Mark IV, some areas within the processing phase create compiled code which can be handled more quickly than the interpreted code used in most of the system.

On the external side, Mark IV now supports the additional sort capabilities offered by IBM for OS and VS and handles tape

positioning for DOS shops, the spokesman said.

The interfaces to both IBMs IMS and Cincom Systems, Inc.'s Total data base management systems have been enhanced. The IMS changes allow users to establish new request types. The system can now cope with logical records greater than 32K bytes and it generates sensitive search arguments, he added.

Total users can now follow sign-on rules provided with their data base system and their "logical views" of the data base can be greater than 32K bytes.

In-house security rules developed for use with TSO are also now acceptable to Mark IV, he noted. Both OQL and BQL for queries through TSO have been enhanced, he added.

Mark IV has been previously implemented across a wide range of mainframes; Release 7 can be used under Univac's OS/3 and under BS1000 on CII equipment in Europe, the spokesman said.

Mark IV ranges in cost from \$22,000 to \$39,000 for non-VS installations and from \$23,500 to \$41,000 for Virtual-oriented shops, with variations based on features selected.

Informatics is at 21050 Vanowen St., Canoga Park, Calif.

### Seminars to Show

## User Satisfaction Can Be Measured

NEW YORK — A method of measuring user satisfaction with a DP project will be discussed by Gerald M. Weinberg, Donald Gause and Daniel Freedman, all of Ethnotech, Inc., in a series of one-day seminars to be given in a dozen cities in the U.S. and Canada in the next three months.

The method works and is therefore a significant advance in the area of user-DP technician relations, the researchers contended, adding that having been able to measure satisfaction at one point in time they are now able to apply their technique on a continuing basis.

The technique has been refined to the point that it can report the degree of satisfaction felt by one member of the end-user group or by the whole group, according to a spokesman for the seminar sponsor, TSI Sales and Marketing, Inc.

It can also focus on the degree of user satisfaction with any of several individual aspects of the project being monitored, he said.

Since they developed the measurement method, the Ethnotech team has also been able to identify ways of increasing the degree of user satisfaction and this will also be covered in the seminars, they said.

The goal of the seminar is to produce an average increase in user satisfaction of 1% within the first week after the course and 5% within six months, according to TSI.

Weinberg, perhaps best known as the author of *The Psychology of Computer Programming*, has completed a book on problem definition with Gause and a handbook on review procedures with Freedman. These will be among the materials distributed to attendees at the seminars, TSI said.

The current schedule calls for presentations in Montreal, Washington, D.C., Chicago and San Francisco in early December. In mid-January, the seminar will be given in Toronto, Atlanta, Houston and Los Angeles.

New York, Cleveland, Minneapolis and Seattle will be the cities toured in early February.

Citing "current involvement in user-DP interaction" as a prerequisite, TSI has set a registration fee of \$195 per attendee. More information is available from the company at 19 W. 44th St., New York, N.Y. 10036.

## 'Create' Builds DG Reports

EL SEGUNDO, Calif. — A report generator package that builds Business Basic programs on Data General Corp. mini-computers, Create was developed by Compusource Corp. here.

Designed for use on either Nova or Eclipse systems, the package starts the program building operation by allowing the user to define the file to be used and then answer a series of questions about the desired report format and content.

Create provides access to both record selection and sorting logic. Answers to one of the questions

may include selection criteria while responses to another can call for records to be in either ascending or descending sequence.

The generator works on a load-and-go basis. It begins to produce the desired report "within minutes" of getting the user's answers, according to a spokesman's estimate.

The package costs \$1,250, which includes a user's manual and correction of any errors detected within 90 days of purchase, he said from 2221 Rosecrans Ave., El Segundo, Calif. 90245.

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CA-SORT users delightedly report remarkable savings! Savings of time and money on actual runs ... not in simulated environments ... not with artificial environments!

### Examples of user reports:

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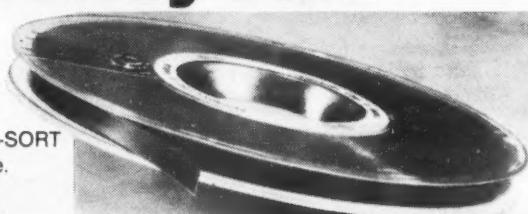
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## 'Data Analyzer' Macro Support Enhanced

MONTVALE, N.J. — Version 5.2 of the Data Analyzer retrieval and reporting system from Program Products, Inc. (PPI) includes an enhanced macro processor, a set of syntax editors and support for recursive use of the system's capabilities.

A macro processor, allowing users to create instructions to suit their own needs, has always been an integral part of the IBM 360/370-oriented Analyzer, a spokesman noted. But the enhanced processor now supports arithmetic operations — which were not available previously — and extended logical functions.

The system includes facilities for complete editing of attributes specified in macro parameters, the spokesman said. This contrasts with earlier versions in which edit facilities were so

limited "we really didn't do any checking," he volunteered.

One of the most useful features of Version 5.2, according to the spokesman, is the support for keyword, rather than positional, parameters in setting up the macros. Good use of keywords generally allows broader use of default options and therefore less coding for common situations, he said.

Support for recursive operations should also result in less coding, he added, explaining that now macros can call macros and sets of macros and individual instructions stored as procedures can call other "procs."

Used in a DOS setting, Data Analyzer can function with as little as 72K bytes of main memory, "but it prefers about 125K," the spokesman said. DOS users generally spend about

\$24,000 for the Analyzer and the options they want, he estimated, but a minimum package for this environment costs \$16,000.

OS installations require 120K, "probably should allow about 140K" and typically pay \$26,000 for an Analyzer package configured the way they want it. A basic OS package can be acquired for \$18,000.

The capabilities being introduced in Version 5.2 of the Analyzer will be included in Audit Analyzer, the specialized release of the Data Analyzer for the auditing profession, but PPI is not ready now to set a delivery date for the enhanced version of the secondary product, the spokesman stated.

PPI is at 95 Chestnut Hill Road, Montvale, N.J. 07645.

## 3350s Eyed By Package

SUNNYVALE, Calif. — Diskplay, the Boole & Babbage, Inc. package that allows IBM DOS and DOS/VS users to know the location of current data sets as well as free space on their disks, has been updated to include support for DOS/VS Release 34.

The package will now support a broad range of disks including IBM's 3350. Other units monitored by Diskplay are the IBM 2311, 2314, 3330 models I and II, 3340 models 35 and 70 and 3344 and compatible drives, as well as the Telex 5625 and Itel 7330 Model 12, a spokesman said.

Diskplay creates and prints a listing of the data sets on a disk by sorting its volume table of contents (Vtoc). The tabular printout shows characteristics including percentage of independent overflow in the indexed sequential files while another, more graphic output shows the relative size, relationship and unused portions of each file, the vendor noted.

The package costs \$495 and can be ordered from the company at 510 Oakmead Parkway, Sunnyvale, Calif. 94086.

## 'CMLIF' Eases IBM 3 File Work

MILLTOWN, N.J. — CMLIF, a file maintenance utility package from Soft Pack 3, frees the IBM System 3 user from the "constant drudgery" of writing file maintenance and file listing programs, according to a spokesman.

The package generates three programs for each file defined to it. These programs perform the required maintenance work, produce a formatted display of the contents of records in the file (within user-specified limits) and produce a dump of the entire file.

CMLIF also produces much of the documentation needed to utilize the generated programs. One output of the package is, for example, a record layout of the file while another is the keypunch-oriented forms needed to enter the maintenance transactions.

CMLIF is normally distributed in object form tailored to the user's system. A license for the software ranges in cost from \$399 (for mail-order customers) to \$1,900 (for customers requiring on-site training and service).

The RPG-II source code is available for a user's internal use for \$5,000, Softpack 3 added from 10 Desmet Ave., Milltown, N.J. 08850.

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# Central Program Eases Heavy 'Omegamon' Use

MARINA DEL REY, Calif. — A "slave output" capability in Release 9 of the Omegamon software monitor from Candle Corp. enables users at various locations in an IBM MVS environment to track system activity from a single central copy of the monitor, according to a spokesman.

## HP System Handles Orders

PALO ALTO, Calif. — Order entry software for the HP 9896 Business Information Management System has been introduced by Hewlett-Packard Co. for small distributors and manufacturers.

The package is integrated directly with the HP 9896-oriented accounts receivable and inventory control software previously available from the company, a spokesman said. The order entry software uses the "receivables" customer data base and the inventory control parts list, he explained.

Beyond that, every order transaction updates the other application files and ultimately impacts the user's general ledger processing, he said.

The order entry package for the desktop HP 9896 costs \$500. Other financial information and control software (Fics) — including general ledger, accounts payable, payroll, ac-

counts receivable and inventory control — cost a total of \$1,300.

The computer system, including both hardware and the Fics software, can be leased for \$577/mo. Delivery can be made in six weeks, HP said from 1507 Page Mill Road, Palo Alto, Calif. 94304.

Previously each user had to work with a separate copy, he added.

Omegamon works under IBM's Time Sharing Option (TSO) through local 3270 CRTs or through dedicated 3270s via EXCP. Running through EXCP allows the monitor to function even if there is a breakdown in the ac-

cess method in the user's system, the spokesman explained.

Under either mode of operation, users can work with a set of commands to extract data on how well the system is running. They also have the ability to save and recall screen formats, showing prior activity, through program function keys on the 3270.

Performance factors to be monitored and reported are user-selectable so the analysis available through Omegamon is customized to the actual needs of an installation rather than generalized for all sites, the spokesman said.

In addition to identifying factors to be tracked, users may set thresholds so reports are not produced until the system exceeds the specified values.

That means the operator can be alert-

ed to critical situations without being swamped by output reporting that things are going within normal limits, the spokesman explained.

A tutorial facility through which Omegamon users have been able to invoke immediate examples of what factors might mean, in terms of the actual system on which the tutorial is being run, has been broadened under Release 9. Now the system can direct output to the printer, creating customized manuals, the company said.

Omegamon is an evolving product and the \$5,000 annual lease fee entitles users to enhancements as well as maintenance on existing facilities, the Candle Corp. spokesman said from Suite 401, 4676 Admiralty Way, Marina Del Ray, Calif. 90261.

## 'SCSS' Runs On DEC CPU

CHICAGO — SCSS, the conversational statistical and tabulation system introduced by SPSS, Inc. for IBM OS users [CW, Sept. 26] and later adapted to the VM/CMS environment, has now been modified to run on Digital Equipment Corp. Decsystem-20s as well, according to a spokeswoman.

Conversion of the software — written largely in structured Fortran — to other systems is being considered or is underway, she added.

With all releases of SCSS, utility routines will be provided to convert system files built up during use of the earlier batch-oriented SPSS to formats required for conversational analysis, she noted.

SCSS is available for an annual, renewable license fee of \$4,000, which drops to \$1,500 for tax-exempt organizations and \$1,000 for academic institutions, SPSS, Inc. said from Suite 1234, 111 E. Wacker Drive, Chicago, Ill. 60601.

Paradyne's new SRM-192 is a short-range modem that operates on either half- or full-duplex lines at data rates up to 19.2KB.

Using either four-wire or two-wire private metallic lines, the SRM-192 provides very low-cost, highly reliable data communications links between transmission devices located within five miles of each other.

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As a result, you can build a high-speed local data network using your own low-cost metallic circuits in just

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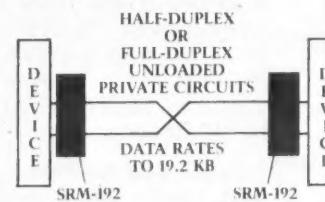
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# User Banks on Benefits From DBMS Swap

Special to CW

NEW HAVEN, Conn. — A bank here has converted one of its primary applications from IBM's IMS to Culinnane Corp.'s IDMS data base management system and the benefits have already been well worth the effort, according to the man responsible for the changeover.

Based on the first success, other conversions are being planned, Bill Sposili, an assistant vice-president and DP manager at the First Bank, said recently.

Switching the software underlying the on-line Customer Information File (CIF) operation has saved roughly half of the virtual storage on one of the bank's two IBM 370/145s and that has provided the opportunity to do a lot of processing that just couldn't be done before, Sposili added.

Like many banks, First Bank relies heavily on its system. It brought the application on-line in 1975 to provide timely, accurate response to questions dealing with basic data: customer names, addresses, active accounts, credit lines and so forth.

About a quarter million customers and 170,000 individual accounts were cross-referenced by the system, which used IMS/VS DB/DC as its data base management system.

By late 1976, "any expansion in the CIF application would force us to a larger machine to more main memory," Sposili said. The system was then consuming approximately half of a 768K IBM 370/145 and several groups within the bank were

dissatisfied:

- Entry operators working at 16 IBM 3270 terminals were unhappy because of poor response times — then a minimum of five seconds and sometimes as long as 20 seconds.
- Programmers were frustrated because they could not compile or test on the same machine during CIF processing; batch partitions often were not available because a simple compilation produced discernible degradation on the CIF side.
- Operations personnel were irate because getting all the work done was increasingly difficult in spite of having two machines.

The problems mostly involved in the data base and data communications system. Largely because of excessive real memory demands by IMS paging activity under OS/VS1 increased and "thrashing" lay at the root of most of the response problems, Sposili said.

In addition, because of required data base and data communications programming, individual programs within the CIF system were growing larger, making matters worse.

## Pair of Packages

Instead of bringing in a larger machine or adding more memory, First Bank assessed its data base needs to see what else could be done. Since the data base system should work closely with the teleprocessing (TP) software, the question of which TP monitor was also addressed.

After an evaluation of a number of available data base and data com-

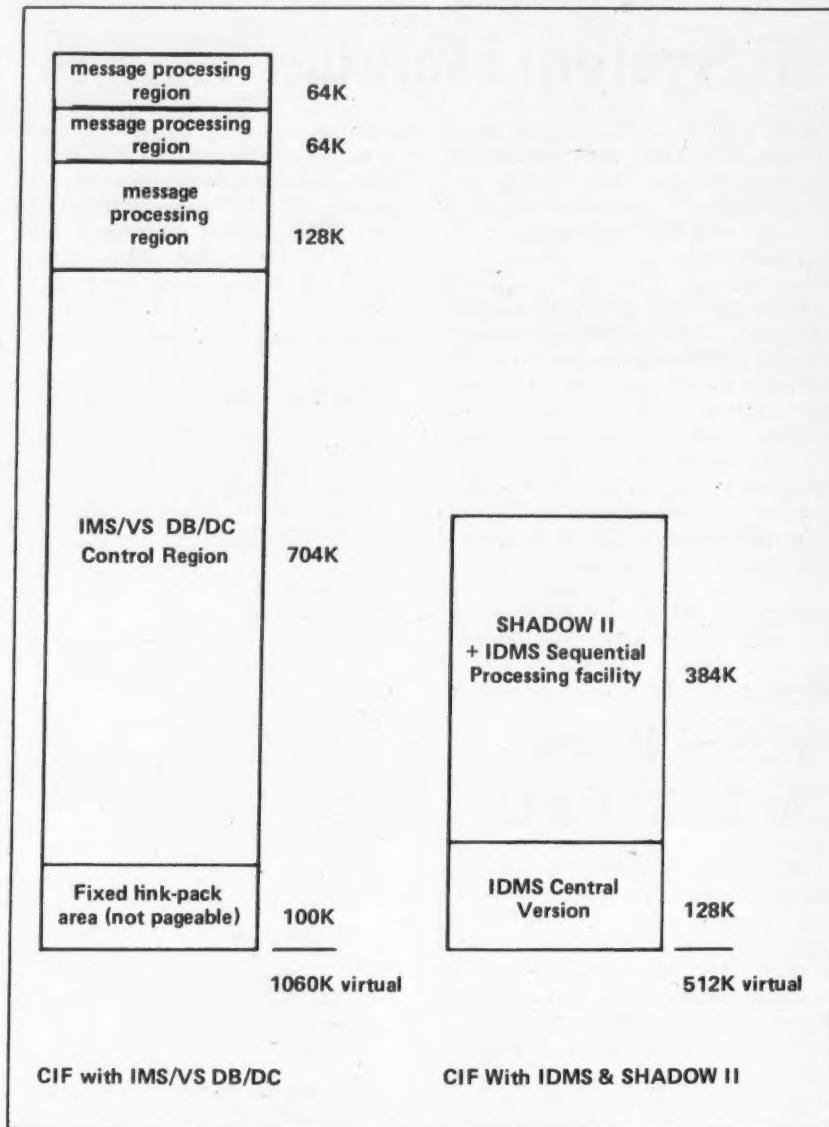
munications systems, First Bank selected IDMS and the companion TP monitor, Shadow II.

On paper, it looked as if that pairing would consume about half the resources being used at the time, an assessment which has proven accurate in "real life."

Tom Puddicombe, systems officer, noted some other features that attracted First Bank to IDMS:

- Its English-like Data Manipulation Language. As an extension of Cobol, no coding at the CALL level is required.

(Continued on Page 28)



Resources Used at First Bank

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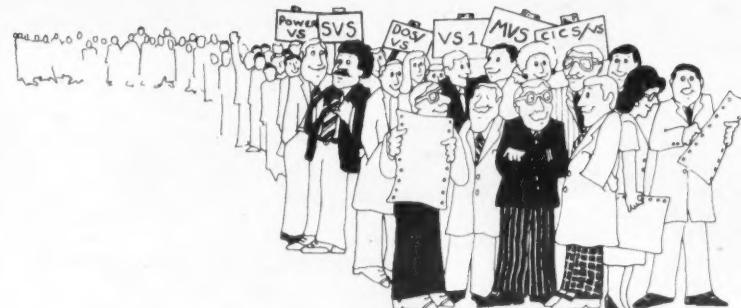
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# Versatile DBMS Enhances Information Center

By Diane B. Farmer

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upper management are becoming aware of the necessities and niceties of having a comprehensive, yet flexible DBMS.

Activities in an information center and library require having data well organized, easily understood and above all readily available to patrons. The number of requests for help in information services is overwhelming. Since most information groups are limited in manpower, DBMS becomes essential to daily operations.

The requirements of Polaroid Corp. in selecting a DBMS included rapid accessibility of the data stored, simplicity of use by department members (eliminating the need for programming staff), ability to compile a variety of reports and indexes in various formats, ability to cope with a tremendous amount of textual material in addition to numerical data and availability of the software to operate on our in-house facilities. Cost of the software was also a factor.

After several software packages were reviewed, the decision to purchase DRS, a data retrieval and management system, was made. DRS is provided by Aeronautical Research Associates of Princeton (Arap), Princeton, N.J. It is a generalized, highly sophisticated, yet easy to operate, user-oriented software package.

DRS operates on several types of computers and is available by time-sharing. We are familiar with operations on the General Automation 18/30, the Digital Equipment Corp. PDP-11, the IBM 370 and time-sharing at Itel/Multiple Access, Inc. in New York.

The system has helped us cope with the increasing activity in the services our department offers. We have found it a useful tool in organizing data in all areas of our department.

The following are some of the problem areas which faced us but which were resolved by using the DBMS.

- Controlling the constantly increasing library book loan program, providing statistical data of usage.

- Controlling the journal circulation, preparing route slips, simplifying yearly subscription orders, determining the accuracy of the data and appropriateness of persons receiving the journals.

- Producing for company wide distribution a bibliographic listing and key word out of context index to selected published photographic articles of interest, using this data base as a tool for literature searches.

- Maintaining literature searches being handled, indexing current and past searches for future reference, producing statistical analysis such as trends and times spent per search.

- Maintaining data filed by the Chemical Information Group, including the Wiswesser Line Notation system and a chemical registry system. More information on this aspect of our activities can be found in "DRS - A User Oriented Information Retrieval System," by G. Szonyi, *Journal of Chemical Documentation* 14 (79), 1974.

- Producing guides to periodicals in the library, including how they are kept, i.e. hardbound, microfilm, microfiche, where shelved and extent

of our holdings.

- Indexing and categorizing of technical files for ease in retrieving the files. Aiding in expansion studies of the files.

- Organizing requests submitted to the Polaroid Foundation. Aiding foundation members by producing budget data, agenda and minutes for the meetings. Producing analysis of the trends in giving, areas of interest, etc.

- Organizing the Product Donation Program and the Matching Gifts Program handled by the Polaroid Foundation.

- Producing indexes for reprint collections, monthly reports requiring indexes and other groups of related data needing organizing.

### User Controls

DRS is a modular software package allowing enhancements easily. It is truly an interactive DBMS prompting the user each step if necessary. DRS has the capability to select a portion or subset of the data base according to the user's specifications. The records can be arranged or sorted in a variety of ways as the user wishes.

The system offers two standard formats for output on either the console or a high-speed line printer. The List format is columnar in form and the Doclist format is horizontal, placing the data across the page.

Output may also be to a magnetic tape or disk file for accessing at a later time. The execute command is given to instruct DRS to output the selection. Controls can be used in conjunction with this command such as skipping lines between records, altering page numbers, ejecting to a clean page when finished. These commands — select, arrange, list and execute — are the basic commands in DRS.

As the user becomes more adept, functional and utility commands may be used. These commands allow such functions as inputting of headings,

changing formats, computing numerical data and storing results in the data base, and translating the contents of a field during printing. The system has the capability to link to a user-written program, such as a Fortran program, and return results to the data base.

The system can generate a complete data base ready for data input when given certain parameters by the user. If all parameters are not given, DRS will supply a default parameter. No highly technical knowledge is required to generate a data base. Since the system is interactive, it will prompt the user during the specifying of the parameters if so desired.

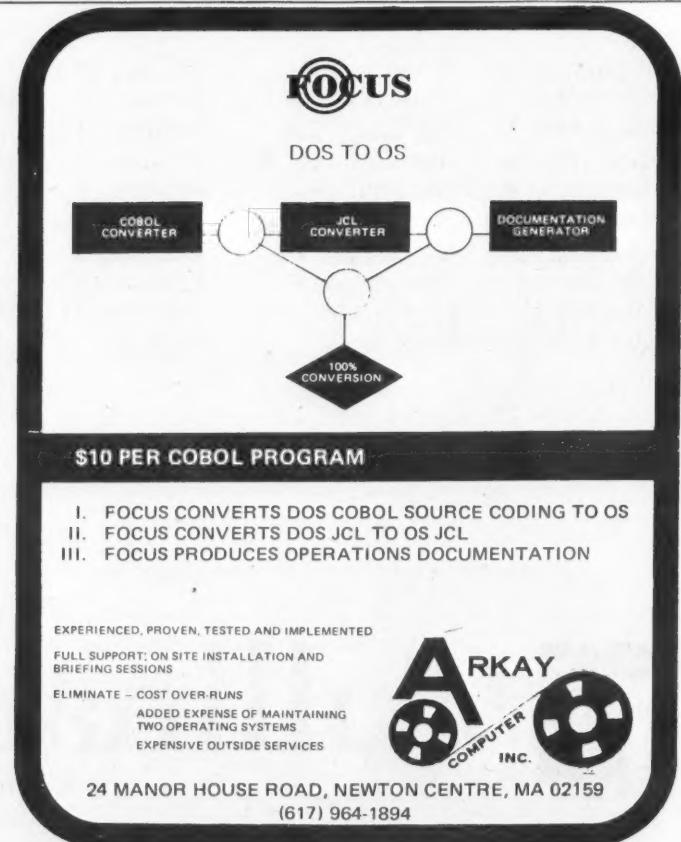
Another excellent feature is the ease of data addition or changes. Records may be input in free-field format, fixed-field format or a combination of both. Special input formats can easily be prepared to accommodate data used in other systems.

The data base contains a number of related records. A record constitutes a number of fields determined by the user at system generation time. Changes in records (modifications) are handled by altering only the fields desired, using either a unique identifier which is user specified or the record key which is automatically assigned.

The deletion command actually eliminates the entire record from the data base. This deletion can either be specific by using record key numbers or by using a selection statement governed by criteria supplied by the user.

Security can be as elaborate as the user wishes. Restrictions can be placed on accessing certain proprietary portions of the data base. If so desired, fields within the records may be restricted. Or the data may be available all the time, but data changes, such as additions, modifications and deletions, may be secured.

*Farmer is an associate operations specialist at Polaroid Corp., Cambridge, Mass.*



# COMMUNICATIONS

## Offers Data Base Service User Joins Turnkey CRTs, Packet Net

By Ronald A. Frank

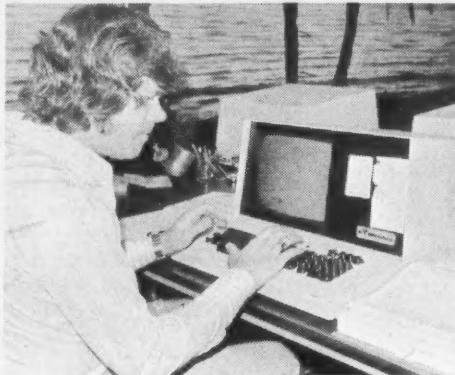
CW Staff

WOODLAND HILLS, Calif. — A terminal user here has combined a packet network service and turnkey terminal systems to provide customers with specialized DP capabilities.

Marketron is a firm which provides DP capabilities to the radio and TV industry. It provides two primary services called Act I and Act II, according to Jim Foley, vice-president.

Act I includes a data base of the latest radio and TV ratings compiled by such firms as Nielson, ARB and The Source. Subscribers to Act I access the Marketron data base, stored on a Digital Equipment Corp. Decsystem-20 using a variety of 30 char./sec terminals on the Telenet Communications Corp. network.

A Telenet Terminal Access controller (a Timeplex T96 multiplexer) connects Marketron to the packet net.



James Foley shows how CRT is used with Act II system.

The data base is accessed by about 230 users, which include radio and TV stations plus sales representatives. The data is used to analyze audiences so commercials will

have the most impact, Foley said.

Act II is a CRT-based system which uses a Cincinnati-Milacron, Inc. minicomputer. The turnkey system includes a 32K processor, 10M-byte disk, General Electric teleprinter and up to three CRTs.

The Act II system keeps track of commercials for about 62 radio stations and makes sure similar products don't run in adjoining time slots. The system also includes accounting and billing capabilities and is installed on-site at radio stations.

Marketron takes advantage of the rugged environment in which the CRT system can operate in a different manner. A complete operating system is installed in a Marketron van; when a prospective customer shows an interest in Act II, the van can be driven to any site in the country for a demonstration.

By allowing a prospective user to sit at a CRT in the vehicle and actually operate the equipment, it is much easier to show what the system's real capabilities are, Foley said.

### Three Versions

Act II comes in three versions depending on storage. The smallest version is called System 14 and contains three floppy disks; it sells for about \$32,000.

The medium-size version is called System 42 and contains four double-density floppy disks; it costs \$45,000 or leases for \$1,950/mo. The largest is called System 100 and is a lease-only system that ranges in cost from \$2,600- to \$3,500/mo with a cartridge disk storage subsystem.

The Cincinnati-Milacron mini was programmed in Assembler language and the instruction set is in a hexadecimal format that looks very much like an IBM 360 or 370 instruction set, Foley said.

By combining the packet services of Telenet with a mini-based system, terminal users with various needs can be served, Foley said. Marketron is at Suite 1020, 21031 Ventura Blvd., Woodland Hills, Calif. 91364.

## Penney's, Korvettes Expanding Their Use of POS Systems

By Molly Upton  
CW Staff

BOSTON — Two large retail firms are happy with their point-of-sale (POS) terminal systems and networks and are expanding their use of POS equipment, according to speakers at a meeting of the Boston Retail Analysts Group here recently.

Although J.C. Penney's and Korvettes have different orientations, they have been able to utilize POS terminal systems to serve their needs, representatives of both firms indicated.

"I'm not sure Korvettes could have survived in the last three or four years without POS," Monty White told the group. White is manager of information services for the retail firm.

Korvettes has made significant cuts in personnel and reduced its inventory by about \$20 million in the last two years, White indicated. The firm has put some of these savings into expanding its centralized buying operations, but "I don't think some of these would have taken place if we could not have done some pruning," he added.

J.C. Penney's has justified its expenditures on POS through hard savings alone in "substantially less than five years," according to Gerry Montgomery, manager of the systems programming technology service department. In the long run, the information gained will be more important than the hard savings, he said.

Penney's has achieved its three original objectives for POS of improving customer service, store productivity and information to all levels of management, Montgomery stated. The firm began using POS in August 1972 with NCR Corp. equipment; it now has more than 300 stores and about 12,000 terminals in place. Penney's philosophy dictates having multiple vendors for its POS gear, Montgomery noted.

All new stores are equipped with POS and the firm is accelerating the pace at which it installs POS in its existing stores, he said.

The average Penney's POS installation has 30 to 40 terminals with a 96K in-store mini and a 20M-byte disk, he added.

(Continued on Page 32)

## IBM 3790 Gains Magnetic Tape

WHITE PLAINS, N.Y. — Users can now attach up to four IBM 3410/3411 magnetic tape units to an IBM 3790 terminal system, complementing the controller's disk storage, the firm said.

The tape units can be used as an I/O medium for the 3790. Data that is processed only periodically can be stored off-line, making more space available on the controller disk for on-line processing, according to a spokesman.

If a job is to be run on a central CPU, the data can be transferred from the 3790 to a

tape, which then is transported to the main site. The tape medium also provides an enhanced backup and restore capability for the controller disk, IBM said.

The enhancement provides for the attachment of one 3411 Model 1 magnetic tape and control unit and up to three 3410 Model 1 magnetic tape units, depending on the particular 3790 configuration.

The tape attachment capability requires two special features which can be leased for a total of \$225, rented for \$265 or purchased for \$9,090. They will be available in June.

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## To Handle System Growth

# Medical Center Using Mini as Concentrator

WINSTON-SALEM, N.C. — A minicomputer serves as a communications concentrator for the Bowman Gray School of Medicine/North Carolina Baptist Hospital Medical Center here.

The Data General Nova 3 allows terminals to be added at various clinics in the hospital without degrading terminal response time. In addition to verifying insurance information in a time-sharing environment, the system prints out claim forms in batch sequence, provides complete patient history and performs general ledger, accounts payable and accounts receivable applications, according to Dick Gardner, DP project leader.

Baptist Hospital/Bowman Gray is a regional medical center with 650 beds and 23,123 patient admissions a year. An additional 206,547 ambulatory patient visits were made to the medical center in a year. The medical center is involved in the education of 397 students pursuing the M.D., M.S. or Ph.D. degrees as well as students in several allied health programs, Gardner said.

Anticipated future growth at the

medical center created the need for a computer system that could adapt to increasing demands on its capabilities.

The system consists of the Nova 3 configured as a communications concentrator for a Honeywell Information Systems 6000 host computer. The system presently provides 40 terminals with 2- to 5-second response time. System expansion can be accommodated with the simple addition of dumb terminals and minor additions to the Nova, with no resulting increase in response time, according to Gardner.

Communications between the Nova 3 and the HIS 6000 host is accomplished on two 9,600 bit/sec synchronous lines. The mini can communicate with 75 Dasher display terminals and an additional 80 printers over asynchronous lines.

### Terminals in Clinics

Approximately half of the terminals are located in doctors' clinics in the medical center, where they are used for professional billing, retrieving pertinent patient information and verifying insurance claim information. Since

each clinic operates as an individual entity at the Bowman Gray School of Medicine, the computer system must handle 26 different clinics staffed by a total of 130 doctors, each of whom can bill patients, Gardner said.

Future plans at the medical center are to add on-line admissions, medical record retrieval, dietary restrictions, laboratory tests and other departments to the system. Some of the resulting data will be used for statistical surveys.

The HIS 6000 computer was

originally used for batch and time-sharing system applications. The alternatives evaluated for upgrading it to handle a large amount of on-line processing included hard-wired, multidrop communication lines, direct lines or an intelligent front-end concentrator. The minicomputer concentrator was chosen, according to Gardner, "because its cost was less than half that of the other alternatives and it provided the best solution to our anticipated growth."

## Two Retailers Expanding Their Use of POS Systems

(Continued from Page 31)

Penney's uses its systems, which are linked via a nationwide network, for credit and check authorization purposes.

For credit authorization, the firm has 23,000 terminals, one half of which are POS. Response time is 3- to 5 sec when the inquiry is made in the same region as the data base and 5- to 7 sec when it is from outside the area, Montgomery said. Penney's network is now handling about 150 million inquiries/year.

At night, the minis process the data collected, performing sales audits, descriptive billing and some analysis of item sales. Item sales are then fed into a data base for use by central buyers.

Penney's has about 50 stores with 1,500 optical character recognition. The retailer has been testing readers and printers for years and that printing technology is now in pretty good shape, Montgomery said.

POS has enabled Penney's to improve customer service, he indicated.

### POS Instead of People

But Korvettes, which is a chain of 58 promotional department stores with a centralized philosophy, is not service-oriented, White indicated. "In place of people, we are using systems," he said. All of the stores are 100% POS and the primary goal is replenishment of merchandise via the central buying facility.

The firm also has used the records retained from the POS system to help it anticipate staffing needs, especially around holidays. The information is specific as to hours of the day, White added.

As a consequence of the POS record-keeping, the store is able to use more part-time employees to carry it through the peaks and valleys of shopper volumes, he said.

"I think we have used the flow of statistics and the psychology of POS to help service," he said.

White estimated Korvettes has halved or cut by two-thirds the costs of alternative systems while receiving more information. Its data processing costs have been "dramatically" reduced, he said, citing alternative system costs of printing punched tickets.

Korvettes goal is a paperless store and White feels the firm has attained one-third of that. There are no visible sales slips, he indicated.

Billing is descriptive — papers only move when there is a question, he said.

White told the meeting NCR has been slow in providing a price lookup capability. Ultimately, the firm would like to tie in "nuisance" paper work with the central system, but that requires a second network, he explained.

A decade from now, White sees a totally automatic order replacement system, with warehouse positions available to the buyer in the central facility rather than to the individual store.

The firm relies on its POS records to aid in purchasing 98% of its hard goods, he indicated.

In providing retail services, the systems have reduced telephone calls for credit checks by 95%, he said. By about the first of the year, White expects to have the credit system's data base hooked to Master Charge, so it can provide positive feedback on credit authorizations.

Korvettes set up its system so any merchandise can be sold from any register, White thinks the firm has reduced errors at checkout counters, and Korvettes soon plans to implement a scheme that will compare sales prices against the master price list to eliminate pass-throughs, or those instances where the clerk charges specific customers less on certain items.

POS data can be used to show some foibles, such as how a particular clerk grants credit authorizations, he said.

## Data 100 Batch Units Get 374X Read Option

MINNEAPOLIS — To enhance its communications capabilities, Data 100 Corp. has added the ability to transmit data on IBM 374X formatted diskettes in a Hasp or 3780 mode via the company's remote-batch terminal systems.

The Hasp and 3780 enhancements, both of which utilize a self-contained dual-diskette reader cable-connected to the terminal controller, allow the user to display the contents of a diskette, read specified data or the complete diskette or multivolume diskettes, and transmit variable-length records from 80 to 128 characters in length.

The new 3780 and Hasp options, which may be field-installed, are each priced at \$53 per month, including maintenance, on a one-year lease. Purchase price is \$2,255. Data 100 said from 6110 Blue Circle Dr., Minneapolis, Minn. 55435.

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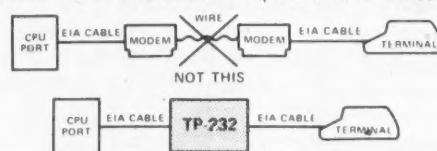
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## For RJE, Data Entry Airline Builds Multifunction Net

ANCHORAGE, Alaska — Wien Air Alaska, operating in a state that has one of the lowest percentages of on-site computer usage, has built a multifunction data entry and remote job entry network.

Using a Data 100 Corp. Keybatch System here linked via satellite to a Continental Air Line's computer in Los Angeles, Wien Air Alaska has reduced job turnaround from as much as a week to a few hours and reduced batch errors from as high as 30% to less than 5%, the airline said.

At the same time, it has developed data entry programs to handle most normal accounting functions, including the calculation of flight pay, and another system to keep track of its tape library nearly 4,000 miles away — all of this with practically no outside help, according to Mic Louther, DP manager.

The decision to abandon its bank service bureau relationship in favor of an RJE facility wasn't all the airline's.

"While we had a lot of the traditional service bureau problems, including long lag times on production work and tests maybe once a week, it was, overall, a reasonable relationship," Louther recalled.

When the service bureau said, however, that because of its own in-house workload Wien would have to find other arrangements, "it was the happiest day in our life," Louther said.

### T/S the Choice

Wien then examined a number of alternatives ranging from using another service bureau to installing its own computer to RJE. Because it appeared to be the most cost-effective approach and because Wien was pleased with its service from Continental's on-line reservation system, it opted for the Los-Angeles-based carrier's time-sharing facilities — a move at least one other major airline had taken.

Finding a hardware manufacturer was both harder and easier. "Because not everyone does business up here," Louther noted, "we quickly narrowed the field to IBM, Mohawk, Data Sciences, and Data 100."

"Since many vendors treat data entry and RJE as parts of a single process and design their machines accordingly, we decided to replace our contingent of keypunches and IBM 3741s as well. We could have beefed up the 3741s in terms of editing features, but the real advantage of the Keybatch system was that it was a perfect match to our needs," he said.

Data 100 received the nod ultimately based on software. "Because of the system's capacity for error checking, table lookups and range checking using sequential tables, in-line tables and Isam tables, we found we could eliminate three-fourths of our key verification," Louther said.

### Surprising Results

Wien's Keybatch system with 12 CRTs, two terminal control units, a dual 800 bit/in. tape drive, a 10M-byte disk and a 1,250 line/min printer has produced some surprising results.

To change airline schedules for Wien, the person responsible no

longer fills out forms and travels to Los Angeles for every new change. Before the system was installed, the scheduler took 35 trips to Los Angeles over two and a half year period — all to ensure that the data and the resulting output was correct.

Now, 49 in-line tables validate the data as the scheduler enters it, the RJE system gets the data back and forth and he gets to stay in Alaska during cold winters.

A 600-statement Keybatch program now calculates the pay amount in less than a second compared with minutes it used to take, Louther said.

In two specific areas — sales and payroll — batch error rates have been reduced from 30% and 25% to 4%. "But these figures are a little misleading," Louther said, "because if there are any errors in a batch of some 300 records, the whole batch is kicked out."

Overall, data entry errors are minimal, he said.

After the data has been entered, it is transmitted at 9,600 bit/sec to the Talkeetna, Alaska earth station, then via RCA satellite to Point Reyes (San Francisco), Calif.

From there, the data is sent over land lines to Continental's IBM 360/65 computer.

While its \$3,500/mo telephone bills are a function of Wien's seemingly distant location, there are other operating problems of being so remote. One of them is sufficient backup if the system fails.

Wien addressed that problem by adding a secondary 10M-byte disk and software to run Keybatch or RJE or both on either terminal control unit.

"While we are paying for a lot more equipment than we actually use," Louther commented, "if we use the backup disk only five days a year, it pays for itself. Besides, with the peripheral selector, if one machine goes down, we can run data entry and/or RJE on the other."

Another problem is how to manage Wien's tape library in Los Angeles. To solve this, Lowther designed and wrote a system which does the job of tape librarian and setup clerk.

When any data is transmitted, it goes first into a setup program; identification records mark the beginning of data for separate jobs. Setup stores the input data on disk, then uses the ID record to extract JCL for each job from the OS procedure library. Once found, Setup scans the JCL for input and output tapes, assigns specific volume serial numbers for both from the tape library file, rebuilds the JCL with the necessary operator information and sends it directly into the Hasp reader.

Jobs then execute normally. Setup prints a new tape library listing each time and also maintains complete control over tapes sent offsite.

"It's been running a year now and we haven't lost a tape yet," Lowther said.

## Transwriter Has Memory Wafers

TORRANCE, Calif. — A self-contained memory typewriter is available from Transaction Data Systems.

The Transwriter, housed within an IBM Selectric II correcting typewriter, uses memory wafers as its media storage, the firm explained.

The wafers are less than 2 in. long, 1 in. wide and .2 in. thick, but are capable of storing up to 20 typewritten pages, according to a spokesman.

The Transwriter has text-editing features such as autotab, stop codes, unlimited amount of new text that can be inserted and automatic lift-off correction and format, he said.

The Transwriter costs \$2,995. Transaction Data Systems is at 2909 Oregon Court, Torrance, Calif. 90503.

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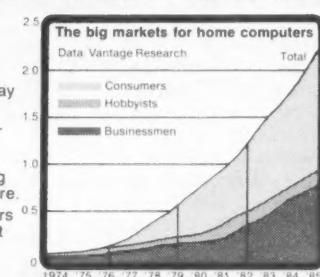
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## Data Trap Eases Diagnosis

PROVIDENCE, R.I. — Hawk 4000, a data trap with a microprocessor that can diagnose communication problems, has been introduced by International Data Sciences, Inc.

The unit can monitor, transmit and receive data between a modem and a terminal using a 9-in., 512-char. screen, the company said. All switches are "stored" in memory and the device can handle full-duplex asynchronous, full duplex asynchronous and synchronous line rates.

The Hawk 4000 is priced at \$9,975 from 100 Nashua St., Providence, R.I. 02904.

## Boeing to Link Facilities Via Satellite

GERMANTOWN, Md. — American Satellite Corp. (ASC) will provide Boeing Computer Services, Inc., a subsidiary of The Boeing Co., digital satellite communications linking Boeing facilities in Seattle, Wash., Wichita, Kan. and Philadelphia, Pa.

The new network, according to Dr. M.U. Ayres, Boeing's director of network services, permits Boeing "to take advantage of recent technological advances in satellite communications."

The service will include direct computer-to-computer digital data transmission as well as digitized voice and facsimile at a basic transmission rate of 56 kbit/sec.

American Satellite will install and operate 5-meter-diameter antenna receive-and-transmit earth terminals at each location. The earth station elec-

tronic equipment is contained in a weatherproof enclosure located next to the antenna.

The agreement also provides for operational testing of a wideband (56 kbit/sec) version of American

Satellite's Satellite Delay Compensation Unit (SDCU). The 56 kbit/sec SDCU, which is expected to provide an increase in data throughput efficiencies, is currently under development, ASC said.

## CRT and Printer Combined

CAMPBELL, Calif. — Data Terminals & Communications (DTC) has announced the DTC-382 data communications terminal combining a CRT with a daisy wheel printer. With this unit, users can have the advantages of CRT operation and the ability to obtain hard-copy printout, the firm said.

The video portion of the DTC-382 holds four (optionally eight) pages of

data, each 80 columns by 24 lines, which can be scrolled over the screen. Eight different field attributes can be used (high intensity, reverse video, blinking, underline, etc).

Insertion and deletion of characters and lines is standard as is sending from screen memory to either printer and/or the RS-232 line, the firm said.

The print mechanism is the Hytype II and a \$250 option allows use of the metal print wheel word-processing version of the printer, which provides proportional spacing as well as 10 or 12 pitch.

Shadow printing, automatic underline and plotting are all standard features. The Model 382 prints forward and backward for faster throughput without the need for host programming.

Pricing at \$5,000 for the unit. A keyboard send-receive version of the printer terminal starts at \$3,750.

Options include pedestal stand (\$100), word processing printer (\$250), dual RS-232 interface (\$250), clock/column and line indicator (\$100), 8-page option (\$750).

Leasing starts at \$137/mo including maintenance. Deliveries of the Model DTC-382 are available in 30 days from DTC at 1190 Dell Ave., Campbell, Calif. 95008.

## Polling System Bows

HOUSTON — A polling system that collects and stores data from up to 200 Series 700 Model 770 intelligent terminals and/or Model 742 programmable data terminals was unveiled by Texas Instruments, Inc.

The Model 704/1 terminal polling system (TPS) stores data in an IBM-compatible format. Following system start up, the TPS automatically polls and stores data on 9-track tape in a format compatible with host computer processing. The resulting output from the host computer can be distributed automatically via the TPS to the terminal network, TI said.

TI stated that the 704/1 TPS offers terminal users a means of transferring data to and from their host computer, while simultaneously relieving the host computer of the requirement to poll, distribute data and keep statistics.

The Model 704/1 terminal polling system consists of a TI Model 990 minicomputer with 48K bytes of random-access memory, a Model 979A 9-track 800 or 1,600 bit/in. tape drive and a Model 743 keyboard send-receive data terminal. The system accommodates up to four telephone lines using internal modems and autocall units, or user-supplied modems.

When a minimum of 10 Model 770 intelligent terminals or 10 Model 742 programmable terminals are purchased or leased by a TPS customers, the one-year lease rate for the TPS is \$1,050 per month, with a basic purchase price of \$13,000. Deliveries of the 704/1 TPS will begin in January 1978 from Box 1444, Houston, Texas 77001.

## Surprise! Your 1100 LPM Printer used up \$100,000 worth of paper this year.

CPU capacity may be getting cheaper, but computer supplies certainly aren't. Our example is true. An 1100 LPM printer running at full capacity will put out some 700,000 pages per month, at a cost of five to ten thousand dollars! (Small wonder that the charges for paper are often the biggest "surprise" in your DP budget.) The need for protecting your DP investment — often at considerable expense — has also increased. And that's why we've devoted our December 26th/January 2nd special report to the many ways to stretch your supply dollars, and safeguard your computer system.

Edited by Ann Dooley, this report — titled *Supplies and Security* — will cover a wide range of supply problems, including everything from forms optimization to analysis of management utilization of DP-generated reports. Here are just a few of the areas to be covered:

- The changing supplies market — demands on the mini user
- An overview of DP media — what to look for, how to get it
- Pooling resources — how four companies share quantity discounts

We'll also look at the practical aspects of computer security in this report, with articles like these:

- Effective contingency planning — targeting danger areas
- Computer crimes and disasters — how to cut losses and minimize risk

If you're a DP Manager, MIS Director or Corporate Executive with responsibility for DP cost control and security, be sure to read the special report in our year-end combined issue. And if you market products or services that cut the cost of computing, or safeguard what's in the computer room — advertise in this report. Ad closing date is December 9. For details, call your Computerworld salesman. To reserve your ad space, call Terry Williams at (617) 965-5800.



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# DP Dialogue

Notes and observations from IBM  
that may prove of interest to  
data processing professionals



## MVS Gives Rainier Bank Performance Dividend

"We did an 'initial program load' of MVS one day and never looked back. Everything was absolutely smooth and problem-free."

William Anderson, manager of system research and technical support for Rainier Bank, Seattle, is describing the bank's recent adoption of Multiple Virtual Storage (MVS) for its two System/370 Model 158's. MVS is IBM's operating system for large computers and multiple-processor installations.

"Now we run the two machines as a Multiprocessor (MP) system, and we move more than a thousand jobs a day through the data center, meeting our schedules consistently. One operator runs the whole system, and machine productivity has increased greatly since we let MVS dispatch the jobs to balance the workload. To meet a deadline, MVS can dynamically apply all the power of the dual system to a single job."

"Since we introduced MVS," notes Frederick S. Haines, senior vice president and manager of information systems, "we've been able to add many major applications on these machines. Our performance monitors show consistent improvement under MVS. System

utilization has increased and continues to increase, thanks in equal part to MVS and to the talents of our system programmers. Processing times for production programs are diminishing, system idle time is diminishing, and jobs per hour are increasing. And the improved performance has let us accommodate more activity without increasing the total data processing resource."

Among the new applications are online teller transactions. "The first branch went online three months after MVS came up," Haines says, "and we've been on schedule ever since."

"We are processing over 100,000 transactions a day now," Anderson adds. "We expect that to rise to 120,000 when all the branches are online."

"The error recovery facilities of the MVS operating system have been superb," he continues. "It has been very easy to bring the system back up—almost like following a cookbook."

"Now we support online program development under Time Sharing Option (TSO) as well as online transactions. MVS and MP allow us to distribute the power of the 158 to the hands of the people who can make use of it."

*Rainier Bank's dramatic new 40-story headquarters building in Seattle, Washington, rises within sight of its namesake: 14,408-foot Mt. Rainier.*

## Distributing DP Resources Improves User Service

### Interactive and Data Management Aids from IBM

Three software products available from IBM extend the power of data processing systems:

1. **Virtual Storage Personal Computing (VSPC)** permits problem-solvers at terminals to interact with the computer in user-oriented languages.

2. **Generalized Information System (GIS)** provides facilities for creating and maintaining formatted files and for extracting data from them, particularly where information needs are spontaneous and varying.

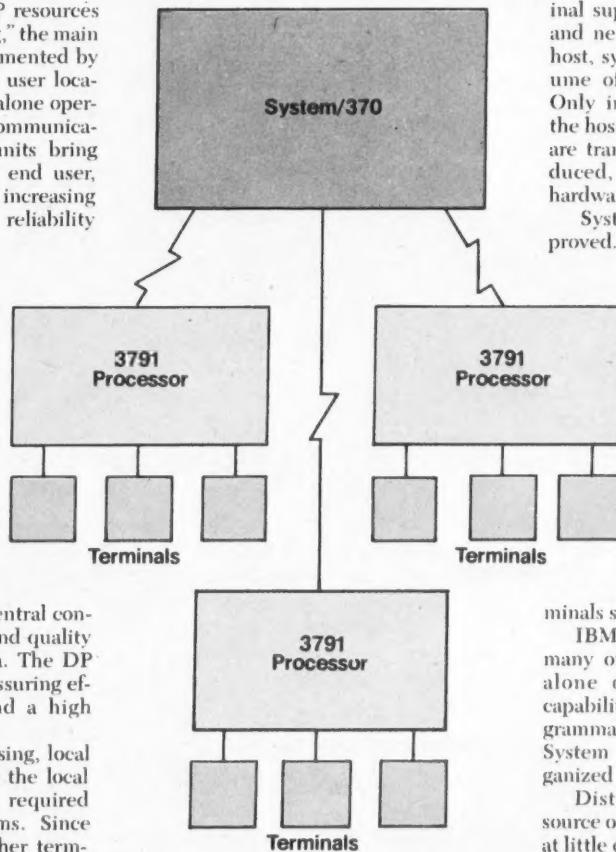
3. **DB/DC Data Dictionary** supports data-base management, aiding the consistent and non-redundant definition of data and the establishment and administration of data standards.

For more information on these and other IBM software products, contact your local IBM branch office or write to the Editor of DP Dialogue at the address below.

In the organization of DP resources called "distributed processing," the main or "host" computer is supplemented by smaller machines in selected user locations. Capable both of stand-alone operation and of terminal-like communication with the host, these units bring computing capability to the end user, simplifying the system while increasing its responsiveness, flexibility, reliability and availability.

The IBM 3790 Communication System extends distributed processing by preserving the benefits of the large-scale computer, and protects investments in existing programs. Local processors have access to the central data base, and the full power of the large computer remains available when required. 3790 distributed processors can be programmed from the host computer, maintaining central control over program standards and quality and over the integrity of data. The DP staff can remain centralized, assuring efficient use of personnel and a high caliber of professionalism.

In 3790 distributed processing, local transactions are completed in the local processor, which stores the required data and application programs. Since screen display formats and other termi-



nal support material are stored locally and need not be transmitted from the host, system response time and the volume of communication are reduced. Only information actually required by the host, such as transaction summaries, are transferred to it. Line costs are reduced, and the total cost of system hardware will increase little, if at all.

System reliability may also be improved. When the host computer is unavailable, the local processor can continue responding to requests for service, storing transaction data until the host is ready to receive it. If a single local processor is unavailable, the impact is limited.

The 3791 Controller brings transaction-oriented processing to remote sites, with each controller supporting one or a cluster of online terminals such as the 3277 Display Station.

IBM offers distributed processing in many other forms, which place stand-alone or communications-oriented capability at remote sites, from a programmable 3770 Data Communication System to System/370 installations organized as satellite processors.

Distributing some of the DP resource outward can improve user service at little or no increase in cost.

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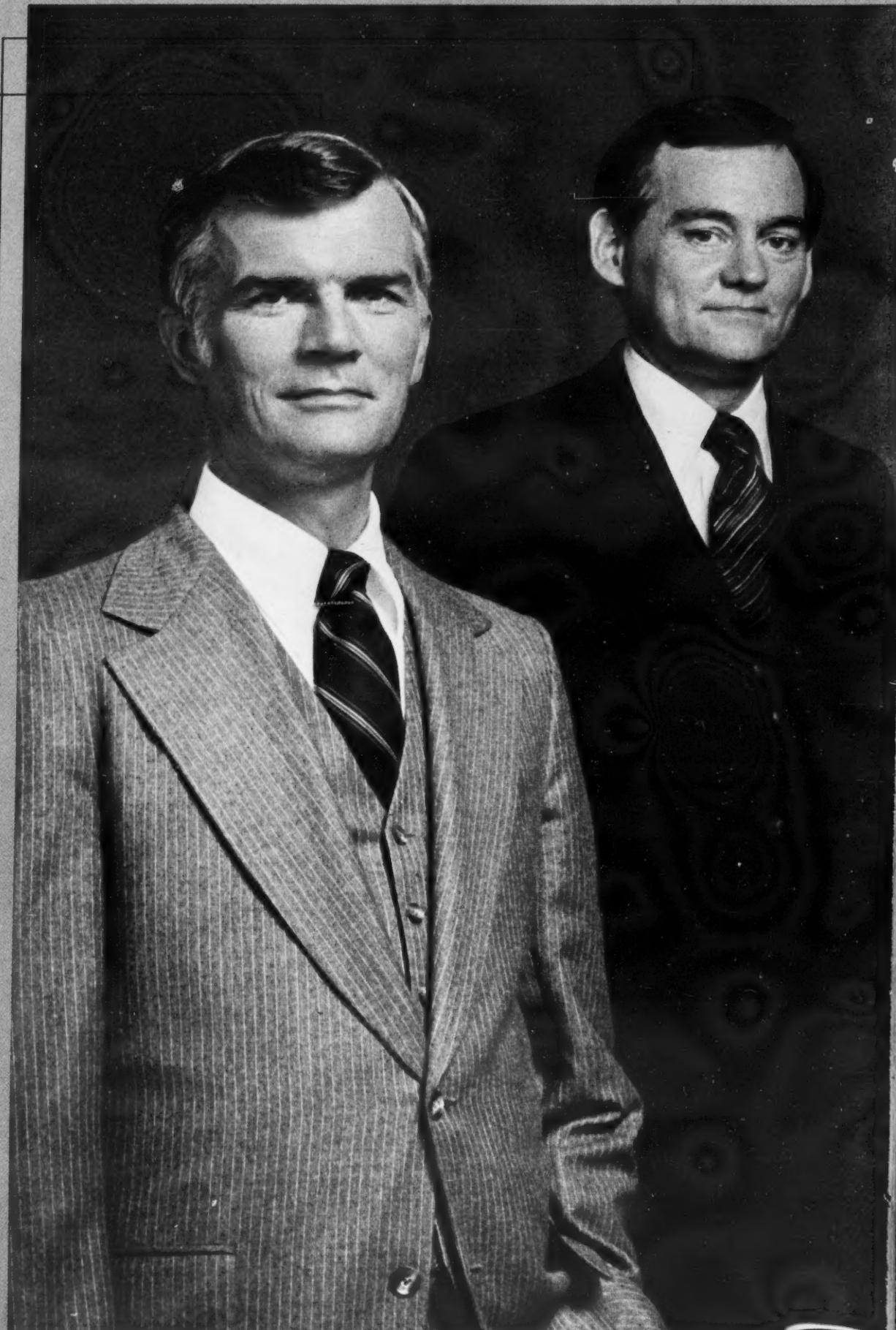
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Of the 5,000 customers served by UCC daily, 700 of them are financial institutions. We're the Banking Division and we specialize in financial application software and computing services for the commercial banking and thrift industries. We must do a pretty good job of it, too, since 2 out of every 3 banks in the Top 100 use UCC software. In our area, the future is spelled EFT... and we're ready for it. All in all, our staff probably represents a concentration of capabilities that is exceeded by only a few of the world's largest financial institutions. In short, they are some of the best and I'm looking for more people just like them.

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## Symposium on Basics Slated

NEW YORK — A two-day symposium covering telecommunication concepts, management and systems will be presented here by American Management Associations at its headquarters beginning January 9, 1978.

Using a series of presentations and discussions, the course will attempt to expand the attendee's understanding of telecommunications systems, a spokesman said. It will also cover equipment costs and performance, operating methods, electronic mail systems and the costs and benefits in relation to corporate objectives.

Topics for discussion will include an overview of the telecommunications industry, word processing as a

communications tool and the implications of satellite communications, the spokesman added.

Sessions related to telecommunications will also be available from the group. "Managing Telecommunications" will be held on April 17-21 in Washington, D.C., and on May 1-5 in Boston. "Interconnect" will take place on Feb. 6-8 in Houston and March 1-3 in Chicago. "Practical Techniques for the Experienced Telecommunications Manager" will be the session topic on June 6-8 at the association's center in Chicago.

Information concerning any of these courses can be obtained from the American Management Association at 135 W. 50th St., New York, N.Y.

## CA Adds Remote Testing

IRVINE, Calif. — A remote diagnostics capability designed for large-scale, multifunctional computer communications networks was announced today by the Commercial Systems Division of Computer Automation, Inc.

The capability, available at no additional charge to users of Syfa network processing systems, centralizes control of network fault isolation and prescriptive action, according to a spokesman.

The Syfa approach reportedly goes beyond existing concepts of remote service in that it can downline load software from a central location that can then perform diagnostics comparable to that which would be expected from on-site service.

If a malfunction occurs that prohibits downline loading, on-site service is

still required. Otherwise, an entire network of remote computer systems could be diagnosed from a central location, the company said.

The capability lets user operations personnel or a field service representative access any Syfa system in a distributed network and execute software that can determine if a fault or failure has occurred in Syfa hardware (CPU or peripherals), Syfa system software, a user-written application program or some aspect of host computer operations, the company said.

## Cassette Drive Stores Data At Terminal

RICHMOND, B.C. — A modular cassette tape drive from Epic Data Sales Ltd. here reportedly eliminates the auxiliary peripherals that otherwise might be needed to gather and store data with the company's 1647 series data collection terminals.

This capability suits the self-contained unit to job-costing and inventory applications at remote sites or departments and to tasks like transaction logging and store-and-forward operations, the firm claimed.

The drive reportedly uses industry-standard cassette tape with biphasic level recording and meets ANSI, ECMA and ISO standards.

With the cassette option, users can cut line costs and free mainframe time by sending report data to a terminal for subprinting, a company spokesman said.

The standard drive reads and writes at 10 in./sec, rewinds at 80 in./sec and searches at 40 in./sec to 80 in./sec while optional drives read and write at 5- to 40 in./sec and rewind at up to 120 in./sec, the company said.

In OEM quantities, the drive costs \$1,485. Epic Data is at 7280 River Road, Richmond, British Columbia, Canada V6X 1X5.

## Unit Gives Dial Phone Pushbutton Capability

BOSTON — A microphone replacement that reportedly can convert a dial telephone into a push-button model was introduced by Super-Electronics.

Soft-Touch, a dial and microphone, is said to eliminate the need to change an entire telephone system. After conversion, a dial telephone can be used for data entry or other DP functions.

Soft-Touch is priced at \$29.95 from Super-Electronics, P.O. Box 230, 80 Border St., East Boston, Mass. 02128.

## Portable Workstation Available From MCS

ANAHEIM, Calif. — A portable terminal workstation has been introduced by Mini-Computer Systems, Inc. (MCS).

The Model 2506 was designed for airline checking gates, shipping/receiving departments, remote inventory control and other applications. It features an 18 in. wide by 24 in. deep work area provided either on the left or right side of the terminal.

The Model 2506 is priced at \$245 from MCS, 2259 Via Burton, Anaheim, Calif. 92806.



### Exhibitor List as of October 1977.

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Datapro Research  
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Applied Digital Data  
Epic Data  
McCormick & Dodge  
Sykes Datronics  
Cummins Allison  
American Microprocessor  
International Data Corp.  
Programs, Inc.  
Beehive International  
Intertec Data Systems  
Software AG  
Creative Engineering  
Graphic Controls  
Mini-Computer Systems  
Tandem Computer

Sperry Univac  
Terminal Rentals  
Applied Data Communications  
Data Forms Company  
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Mathematica  
Rianda Electronics  
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Diablo Systems  
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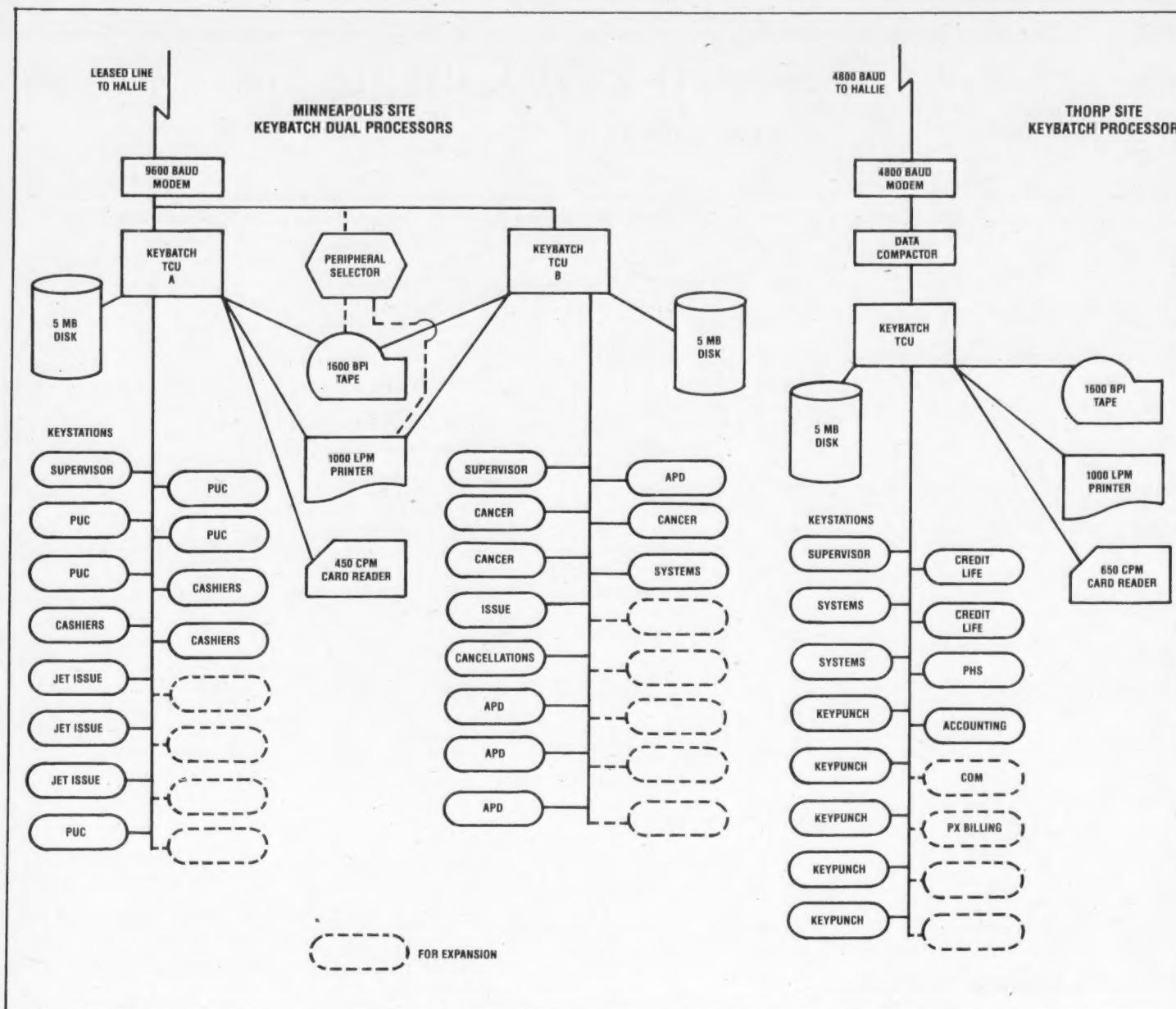
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# SYSTEMS & PERIPHERALS



ITT Life Insurance Corp.'s Data Entry System

## With Switch to Key-to-Disk Data Entry Time Cut 66%, Errors 40%

THORP, Wis. — A life insurance company that switched from punched card data entry to key-to-disk technology has cut its data entry time by more than two-thirds and reduced data entry errors up to 40%, according to the firm.

The ITT Life Insurance Corp. here has some 360,000 policies in force and processes 500 to 700 new policy applications every day, according to James R. Dooley, vice-president and director of information services.

Dooley said ITT Life chose Data 100 Corp. Keybatch system for a number of reasons: "The system provides concurrent data entry and RJE [remote job entry] and had [IBM] Isam capabilities, which we wanted for file accessing.

"Data 100 would also have to maintain the system in our Thorp location — one reason why several vendors dropped out of the selection process. Also, the firm provided delivery in 30 to 45 days," he added.

The system was installed at the company headquarters here late in 1976. A second dual Keybatch system went into the company's offices in Minneapolis.

The current system in Thorp consists of one Keybatch terminal control unit, a 600 card/min card reader, a 1,600 bit/in. tape drive, a 5M-byte disk unit, a 1,000 line/min printer and eight keystations. The system is connected by a 4,800 bit/sec private line to an IBM 370/145 in Hallie, Wis.

Data 100 data compactors are also used to speed up the data transmission times, which

has resulted in increased printing speeds, Dooley said.

### Minneapolis Division

The Minneapolis division has dual Keybatch control units; a 1,000 line/min printer; a 1,600 bit/in. tape drive; a 450 card/min reader; two 5M-byte disk drives with a selector switch to enable communications switching; a tape drive and printer between the two processors; and 20 keystations.

That system is connected by a 9,600 bit/sec leased line to the CPU in Hallie.

At the time ITT Life converted to Keybatch, the company's new business coders were trained and upgraded to data entry operators. "Conversion was very easy," Dooley said, "because the system is almost self-explanatory. It asks for the data, eliminating errors formerly caused by coders

(Continued on Page 42)

## Firm Meets Clients' Deadlines With 'Distributed Keypunching'

By Tim Scannell

CW Staff

ROANOKE, Va. — The owner of a contract keypunching firm here manages to meet his customer's deadlines by utilizing the talents of people working at their own homes.

Ben C. Payne, president of Data Entry Services, has installed reconditioned keypunch machines in the homes of various employees. Work is delivered to these employees, usually by Payne in his Volkswagen, and then picked up when it is completed. At present, Payne employs 13.

All of the keypunches, IBM 024 and Verapower machines, are at least 25 years old. At first, maintenance of the machines was a problem because technicians refused

to make the "house calls" necessary to examine the units for repair.

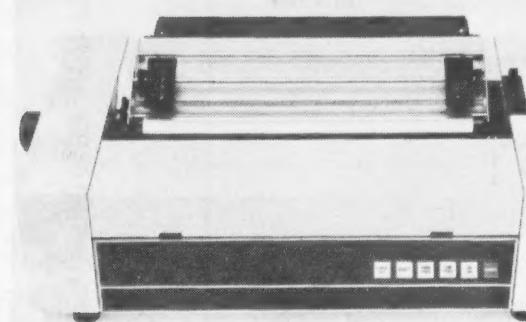
After considerable coaxing by Payne, they were eventually persuaded to furnish their services and supply a maintenance contract that currently costs between \$250 and \$300 per month.

Since his business is based only 250 miles from Washington, D.C., Payne receives what he termed "a fair amount" of government subcontracting work. One such assignment involved aiding the government in the yearly task of registering aliens.

Payne and his company were responsible for keypunching data off the forms submitted by 300,000 of the more than five million to eight million aliens registering that year,

(Continued on Page 42)

## Printers Introduced



Lear Siegler Model 201

ANAHEIM, Calif. — Lear Siegler, Inc. has introduced a line of bidirectional printers that reportedly feature improved throughput and a controlled current regulation circuit.

The 200 series includes the Model 201 matrix printer and the Model 210 receive-only communications teleprinter. They are equipped with a standard 36-pin parallel and RS-232 interface, respectively.

The throughput capacity of each printer is 75 line/min for 132-char. lines; 120 line/min for 80-char. lines/ and more than 900 line/min for 1-char. lines, a spokesman said.

Features include current regulation circuit that delivers only the amount of power required to drive the print head.

The print head was designed for demanding operation and has a print life that is reportedly greater than that of solenoid-type heads.

The units also feature a servo carriage drive, a built-in ribbon reinking roller, the ability to print paper stock up to 100 lbs and the ability to print single- or multiple-part forms, the firm said.

The Model 201 sells for \$2,895 and the Model 210 is priced at \$2,995. Lear Siegler is at 714 N. Brookhurst St., Anaheim, Calif.

## Data Entry Course Slated

NEW YORK — A course concentrating on the problems and procedures of data entry management will be held at the headquarters of American

## Key-to-Disk Cuts Insurer's Errors

(Continued from Page 41) having to manually interpret each individual field on the manual coding form.

"The high quality of technical support also contributed greatly to the successful conversion effort," he said.

At the Minneapolis office, seven divisions are currently using the system. Three Application Processing Divisions (APD) handle new policy applications.

The largest input volume is generated by the APDs. Data is entered from source documents — the insurance application — through keystations located in each division.

The system prompts the operator as to what fields are needed; each application has a policy form number. The operator signs on the terminal, enters the program to be run and enters the policy form number for a specific application.

The system then asks for the fields needed for that policy form. For example, a cancer

indemnity application requires certain fields.

Under the former code sheet and punched card system, it was up to the new business coder to remember what fields were needed for a particular application. If the operator coded this information incorrectly, it went into the system, was rejected by the CPU, manually corrected the next day and resubmitted.

Now errors are caught at time of entry, eliminating the wait, Dooley noted.

### Batch Balancing

Another feature contributing to increasing accuracy, according to Dooley, is the dynamic batch balancing feature of the system that ensures all batches are in balance before transmission to the host CPU.

Operators can enter data as it appears on the application form in a left-to-right, top-to-bottom sequence. The data is then reformatted at transmission time, according to the format required by the CPU.

"Under the old system," Dooley recalled, "it took between five and eight minutes to complete a coding form. With Keybatch, the fastest operators are now entering certain applications in 42 seconds."

Operator performance is ascertained through the operator statistics software feature, which keeps track of production, providing a basis for judging both system and personnel efficiency.

The new business application uses Isam software to scan the company's list of agencies to determine commissions for each agency. Isam allows instantaneous access to the desired agency with a single inquiry from the keystation.

The Minneapolis office runs the system three shifts a day, five days a week. At Thorp, the system runs 18 hours a day, six days a week.

In both locations, data is placed on disk for batch transmission to Hallie. Every hour the contents of the disk are saved on tape so that if the system should go down, the most the user department operators would have to reenter would be the previous hour's work. Source documents are retained in the user departments until the tape "save" has been completed.

The dual system in Minneapolis also provides 100% backup for the terminal control units. "We can switch over to the other Keybatch control unit and handle our business for the day, retaining full use of communications, the tape drive and printer," Dooley said.

Besides speeding up the data entry process and cutting down on errors, the systems have helped streamline the company's operation, Dooley said.

The keypunch and verification functions have been eliminated entirely for the New Business Division and fewer people are needed in user departments, he added.

The keypunch data entry process required application processing to be cut off early in the day so that keypunching could be completed in time for the daily transmission of data. Now data is batched and ready for transmission immediately.

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## Keypunch Jobs Distributed

(Continued from Page 41) he recalled.

Some of Payne's employees have been working at home for Data Entry Services for over 12 years. Carolyn Wilson, who heard about the service from a friend who already had a machine installed in her home, decided to try it herself because of family responsibilities.

"At that time, my baby was very small and I wanted to be at home, yet I liked the idea of having money of my own," she said.

The people employed by Payne, realize the work is not steady and depends on the number of contracts Data Entry Services gets. Most of them, therefore, do not keypunch for a living.

"The type of work we do is contract keypunching and our work is up and down. Sometimes we're real busy, and then we may have 40 hours with nothing to do. Some of the keypunchers go a month without having a thing to do," Payne said.

Seeing that the work is delivered to his employees sometimes involves a great deal of effort and time on

Payne's part. One particular Sunday, he had to deliver work to various home keypunching sites that were spread out over a 100-mile radius; it took four hours of driving time in order to meet a Monday morning deadline.

Some employees have given Payne the key to their back doors to make it easier for him to leave work with them. "This is okay, but you have to have an understanding wife who realizes just what your business involves," Payne said.

Most of Payne's workers are classified as employees, but some are listed as independent contractors because of tax purposes and the sometimes limited amount of work.

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# Harris Configures Five Newspaper Systems

MELBOURNE, Fla. — Harris Corp. has introduced five copy-processing systems designed to provide DP capabilities in the editorial, classified, display and business departments of smaller newspapers.

The Model 2531 is suited for newspapers in the 20,000 daily circulation range which produce in excess of 100 pages per week, Harris said.

It consists principally of a system controller with 128K bytes of main memory, the HNS/2 operating system software, four Harris 1720 editorial terminals, interfaces to support optical character recognition (OCR), high- and low-speed wire lines, on-line typesetting and on-line Harris Microstor and 2200 systems, as well as two 66M-byte duplicate-recording disk drives.

#### Up to 28 Terminals

The Model 2531 is reportedly expandable from four to 28 terminals. It also has a console control device for system monitoring and interfaces that include a paper tape reader/punch, a 180 char./sec line printer and multiplexer ports for up to 16 devices.

The Model 2532 is similar to the 2531 except that it supports eight Series 1700 editorial terminals and up to 24 multiplexer ports for extended input and output device attachments.

The Model 2533 includes 12 Series 1700 editorial terminals; through the

use of up to four Microstor controllers, an additional 24 reporter terminals can be added. It can also accommodate the Harris 2230 Video Layout System and the Harris Fototronic typesetters.

The Model 2534 includes 16 Series 1700 terminals and can handle up to 16 other I/O devices within its 32-multiplexer port configuration. With the addition of up to four Microstor controllers capable of accommodating six terminals each, this system can be expanded to 40 input and editorial terminals, Harris said.

The Model 2539 is a dual-purpose system. It is basically a business-oriented system but it can also act as a backup for any of the other 2530 family configurations, Harris noted.

With its software, this system can perform general accounting, circulation, distribution, physical inventory, payroll, management analysis and other business DP tasks, the firm said.

All five systems feature dual data base storage devices of 66M bytes each, providing a total of 132M bytes of storage. The 2531, 2532, 2533 and 2534 feature a "spare" processor and cabling which can be switched on-line within a half hour in the event of a main processor power failure, Harris said.

The systems can accommodate the 1720 and 1740 editorial terminals that feature an edit trace function and dual-screen monitoring of wire and staff-written copy, the firm added.

All systems except the 2539 operate

under the HNS/2 newspaper software, which provides automatic copy handling, storage, retrieval and control to minimize staff involvement in copy movement and management, the company noted.

A typical Harris system with a console; terminals; two OCR input interfaces; two typesetter interfaces; four on-line wire lines; a line printer and a paper tape reader/punch supported by a 128K controller with two 66M-byte disks and dual recording software; HNS/editorial, wire, display and classified software systems; and complete installation, training, and warranty support is priced at approximately \$250,000.

Harris is at 505 Rodes Blvd., Melbourne, Fla. 32935.

## Financial Use Of DP Systems Topic of Course

NEW YORK — A course that deals with DP concepts and their integration into financial and accounting systems will be presented by the American Management Associations (AMA) beginning Jan. 18 in San Francisco.

The two-and-a-half-day seminar will analyze and evaluate present systems and introduce methods of implementing new ones, AMA said.

"Developing DP Systems for General Ledger and Financial Statement Preparation" will cover data base design, maintenance, techniques and security as well as the attributes of a well-defined DP financial system, a spokesman added.

#### Conversion Help

The course will instruct the attendee in the methods of converting from a manual, loosely controlled general ledger system to an "effective, responsive and adaptive" automated system, he said.

The course will be available in three other cities during the coming year. It will be held in New York beginning Jan. 30, in Atlanta on March 27-29, in Chicago beginning April 12 and again in New York June 26-28.

Registration fees for each meeting are \$375 for AMA members and \$430 for nonmembers. Team discounts are available for groups of three managers who are attending the same meeting; with the discount, it will cost \$320 for AMA members and \$365 for non-members.

Registration materials can be obtained from AMA at 135 W. 50th St., New York, N.Y. 10020.

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DP72/CW117

## Readers Gets Mark Option

MELBOURNE, Fla. — An optical mark reader that is available as a factory-installed option for the DOC 6501 card reader has been introduced by Documation, Inc.

The DOC 6501M, when added to the 6501 reader, can register both punched data and that which is created through black pencil marks, the firm said.

The option will accommodate a mix of punch and optically marked data in any sequential order as well as punched holes and optical marks on the same card.

The 6501M allows mark-sense formats of up to 100 columns and can read a variety of cards by flipping a switch.

The factory installed optical mark reader option is available for \$2,400. Documation can be reached through P.O. Box 1240, Melbourne, Fla. 32901.

## Burster Handles Eight-Part Forms

PALO ALTO, Calif. — A burster that can separate forms with up to eight carbon-interleaved or carbonless parts was introduced by the Tab Products Co.

The Model 2476 burster can accommodate forms from 2.75 in. in length to 20.5 in. wide and 14.5 in. in length, a spokesman said.

The burster features variable speed which assures that all forms are burst up to 350 ft/min, he added.

The unit also has a jam detector that can automatically stop the machine if a form should fail to enter the stacker properly, he noted.

Features of the burster include tractor pinfeed, slit or wedge see-through top, independent slitter drive mechanisms, an adjustable bursting bar, stacker run out switch, electronic static eliminator and a caster base.

A medial chip remover is available as an option for the

2476. It can extract the 1/4-in.-wide medial chip used to hold continuous tab cards together.

It also removes the perforated trim and stacks the individual cards in sequence, the firm said.

The burster is priced at \$3,350 and the optional chip remover sells for \$200 from Tab Products, at 2590 Hanover St., Palo Alto, Calif. 94304.

## AMA Course Set On Management Of DP Projects

NEW YORK — A four-day course designed to explore the fundamentals of managing a project from initial organization to final development will be presented by American Management Associations (AMA) in Atlanta beginning Dec. 12.

"Basic Project Management: Planning, Scheduling and Control" will consider, in detail, such aspects of project management as estimating activity span time; organizational conflicts and their resolutions; management obligations; knowing how and when to use a computer; and making effective cost/schedule/performance trade-offs, AMA said.

The course will present case histories and exercises that will involve the participants with day-to-day applications of project management theory and solutions, it added.

Workshops will also be available in which emphasis will be put on the practice of developing project plans and controls, AMA noted.

The seminars will also be offered in New York and Newport Beach, Calif., Jan. 16-19; in San Francisco beginning on Feb. 6; in Boston March 6-9; and at other locations.

Registration fees for the course are \$550 for AMA members and \$630 for non-members. Team discounts are available to groups of three or more people attending the same meeting at \$470 for AMA members and \$535 for nonmembers.

Additional information can be obtained from AMA, 135 W. 50th St., New York, N.Y. 10020.

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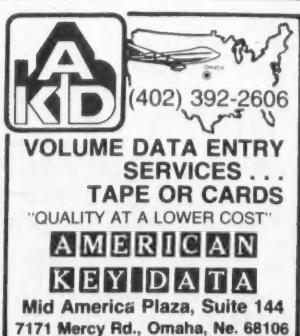
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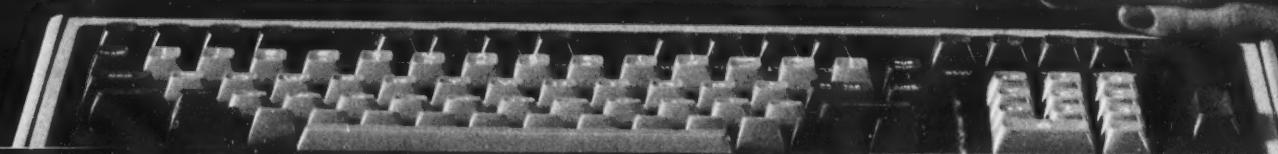
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1978	0.98	22.8	35.2	52.8	74.8	107.5
1979	0.97	27.4	35.5	52.8	86.7	127.8
1980	0.47	28.1	28.1	52.8	101.9	155.6
1981	0.71	27.1	62.1	72.1	101.9	175.9
1982	1.2	32.6	56	88.7	120.5	179.2
1983	44.4	44.4	72.9	104.3	151	206.2
1984	85.2	85.2	97.2	127.9	176.4	251.2
1985	61.2	61.2	121.2	127.9	217	288
1986	70.1	70.1	101.1	107.8	248.2	344



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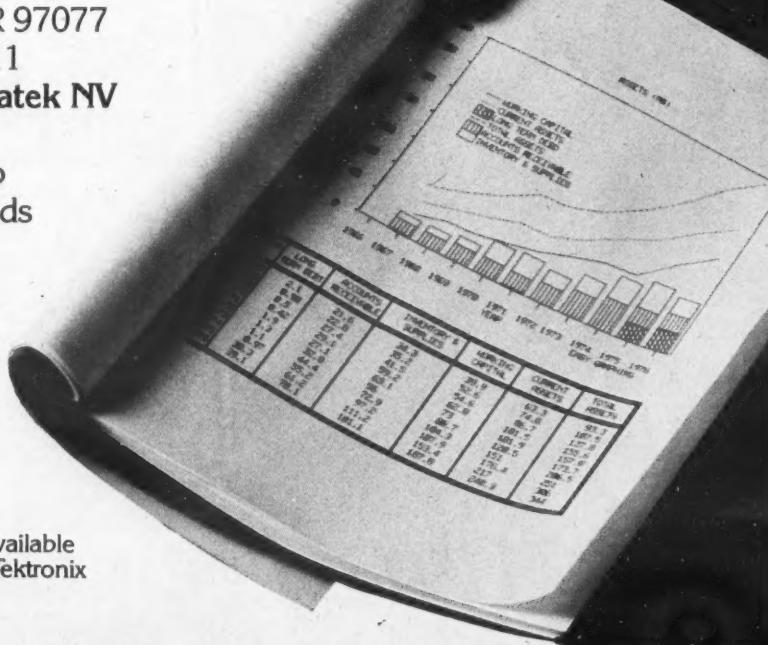
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## Texwipe Spray Removes Static

HILLSDALE, N.J. — A nonflammable, noncorrosive, antistatic aerosol spray formulated to remove static charges from the computer environment has been introduced by the Texwipe Co.

Antistat will remove static around data entry and CRT terminals, computers, word processing stations, printers and magnetic tape and disk drives, a spokesman said.

The spray will effectively eliminate static when applied directly to furniture, floors and carpets and around DP equipment, he added.

When used at regular intervals, it reportedly prevents

static build-up in the computer environment.

The spray sells for \$39.50 per case of 12 from Texwipe in Hillsdale, N.J. 07642.

### Paper Tape Reader Features Dual Modes

SAN GABRIEL, Calif. — A paper tape reader that reportedly has the ability to read 5- to 8-level tape and to transmit 7- to 11 frame char. at 50- to 9,600 bit/sec has been announced by Addmaster Corp.

The Model 612 has a transmission rate of up to 150 char./sec, synchronous or asynchronous, and a feature

## Bits & Pieces

that permits starting and stopping on character at all speeds, according to a spokesman.

The unit also offers a choice of manual control or automatic on/off, 90V to 260V, 50- to 60 Hz power and even, odd or no parity.

The reader, which can accommodate RS-232, current-loop or parallel outputs, ranges in price from \$625 to \$725, Addmaster said from 416 Junipero Serra Drive, San Gabriel, Calif. 91776.

### Analogic Introduces Current-Loop Converter

WAKEFIELD, Mass. — Analogic Corp.'s line of data converters has been expanded by the addition of the MP1480 12-bit current-loop D/A converter.

The device is modular with a built-in storage register. It acts as a digitally controlled current valve for standard or other customer-selectable current ranges or as a voltage output D/A converter, Analogic said.

The MP1480 was spe-

cifically designed for application in industrial process control systems.

The MP1480 is priced at \$135 for a single unit and at less than \$100 in lots of 100, Analog's A/D/A Modular Products Group said from Audubon Road, Wakefield, Mass. 01880.

### Talos Has Digitizer For Geophysical Use

SCOTTSDALE, Ariz. — A geophysical digitizing system that can reportedly convert graphical data and information into computer language for data analysis has been announced by Talos Systems, Inc.

The system consists of a Talos digitizer with a 12-button cursor, a data processor, display, software package and an output capability for connecting to tape drives, punches or card punches, a spokesman said.

The digitizer is capable of resolving graphics to a standard .001 in. with accuracies of each point to .005 in.

Software routines include well logging, topographical mapping, point identification, velocity, profiling and scaling.

The Geophysical Digitizing System sells for \$16,000 from Talos at 7419 E. Helm Drive, Scottsdale, Ariz. 85260.

### Converter Offers High Resolution

PHOENIX — An analog-to-digital converter with a resolution of 1 part in 65,535 (16 binary bits) has been introduced by Phoenix Data, Inc.

The ADC 2000/2100 has an accuracy of about .004% with an approximate .002% linearity, the firm claimed.

With a total power consumption of 500 MW, the analog input circuit reportedly accepts a full-range 8.192V signal with optimum system isolation.

Its design utilizes the excessive approximation technique and CMOS circuitry, a spokesman noted.

The unit, designed for airborne and other critical applications, has a price tag beginning at \$725. Phoenix Data is at 3384 E. Osborn Road, Phoenix, Ariz. 85021.

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The following publications are available to users at no cost:

- A six-page brochure on temperature cycling is available from Larry Benjamin, Ransco Industries, 2221 Statham Blvd., Oxnard, Calif. 93030.
- Datapoint Corp. has published its systems catalog. It is available from the firm's Marketing Communications Department, 9725 Datapoint Drive, San Antonio, Texas 78284.
- A four-page brochure describing the CRT 2000 flatbed plotter photocomposition system is available from Image Graphics, Inc., 1525 Kings Highway, Fairfield, Conn. 06430.
- A data sheet covering the capabilities of the Multimemory/148 processor storage system is available from the Electronic Memories and Magnetics Corp., 3216 W. El Segundo Blvd., Hawthorne, Calif. 90250.
- Literature spotlighting its 3300 series disk drives can be ordered from the Okidata Corp., 111 Gaither Drive, Mt. Laurel, N.J. 08054.
- A 12-page publication detailing a series of hybrid integrated circuit data converters is available from Hybrid Systems Corp., Crosby Drive, Bedford, Mass. 01730.
- A user's report documenting applications of the Versatec Co.'s 360/370 output system in computer-aided design, mapping, business reporting and graphics is offered by the firm at 2805 Bowers Ave., Santa Clara, Calif. 95051.
- A 40-page pocket catalog covering tapes, resins, flexible insulation and tubing, equipment and special services is available from the 3M Co., P.O. Box 33600, St. Paul, Minn. 55133.
- A 16-page catalog of Anritsu communications measuring instruments and their applications is available from Tau-Tron, Inc., 11 Esquire Road, N. Billerica, Mass. 01862.

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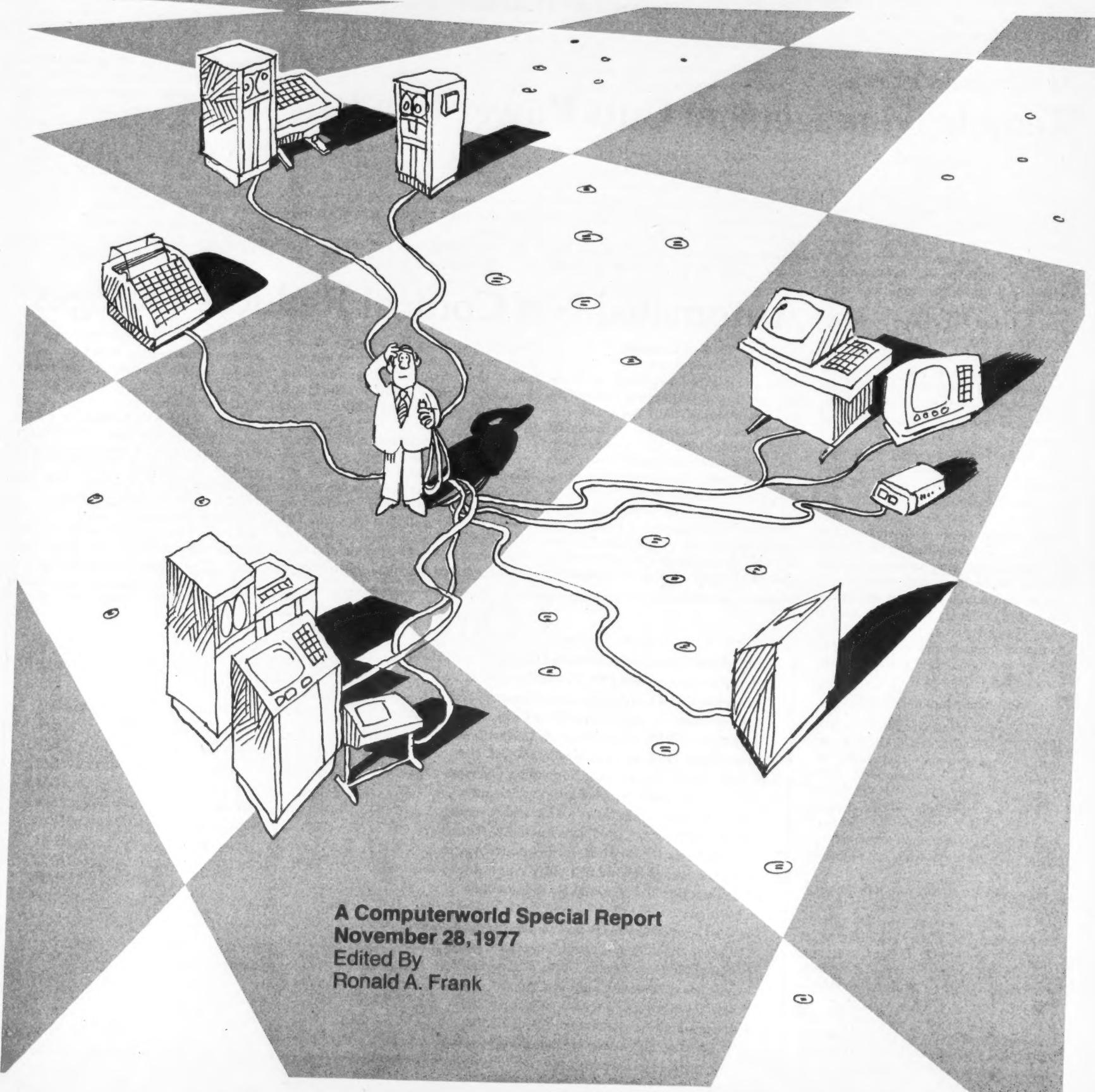
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DATA COMMUNICATIONS NETWORKS

# MAKING THE RIGHT CONNECTIONS



A Computerworld Special Report  
November 28, 1977  
Edited By  
Ronald A. Frank

# Standards Complicate Overseas Data Nets

By Ralph Lowry  
Special to CW

Just as the international telephone network has made voice communications with virtually all corners of the world almost as simple as a locally dialed call, the same network can provide efficient and reliable data communications services. Leased telephone lines via both satellite and cable span all the oceans and direct dial service is likewise possible between countries and continents.

All that is necessary to convert the voice network into a data communications network is the right modem. A modem, as data communicators know, converts the digital signal of a computer or terminal into an analog signal using the same bandwidth as a normal voice conversation. A modem at the other end of the link then accepts the analog signal and recreates the transmitted digital signal. Voila — data communications.

Bell Type	CCITT Recommendation	Usage	Speed	Line	Modulation	Operation Mode
103/113	V.21	Dial or Leased Line	0-300 bit/sec	2W	FSK	Asynchronous
202	V.23	Dial or Leased Line	0-1,200 bit/sec	2W/4W	FSK	Asynchronous
201 B	V.26	Leased Line	2,400 bit/sec	4W	PSK	Synchronous
201 C	V.26 bis	Dial or Leased Line	2,400 bit/sec	2W/4W	PSK	Synchronous
208 A	V.27, V.27 bis	Leased Line	4,800 bit/sec	4W	DPSK	Synchronous
208 B	V.27 ter	Dial	4,800 bit/sec	2W	DPSK	Synchronous
209	V.29	Leased Line	9,600 bit/sec	4W	QAM	Synchronous

Table 1. Functionally Equivalent Bell and CCITT Modems

Unfortunately, just as language differences make voice communications between countries difficult, differences in modem standards can make a computer in the U.S. unintelligible to a terminal somewhere in Europe. So there are a few basic facts about modem types which must be understood before undertaking international data communications.

In fact, throughout the world there are two generally accepted standards for modems. The first is really a de facto standard established by AT&T in the U.S., simply because it represents the modem types supplied by AT&T for data communications networks.

Independent U.S. modem manufacturers for the most part make and market compatible or Bell-equivalent devices for the domestic marketplace.

This is especially true in low- to medium-speed applications which utilize the dial (DDD) network, since it is desirable to be able to interchange modems to gain the advantages an independent vendor might offer, yet still be able to communicate through Bell devices.

The exception to this situation is in the higher speeds, which were pioneered by independent vendors. Most high-speed applications (4,800 bit/sec and above) are implemented over dedicated (private) facilities so that a user simply orders modems for both ends of his link from a single vendor. In the higher speeds, compatibility is less of an issue than are the performance characteristics, the diagnostic functions, the optional features and the price differences.

The rest of the world, however, utilizes a different standard. The International Telegraph & Telephone (Continued on Page S/14)

## At Wholesaler's Centers

### Remote Management Cuts Power Use 10%

By James R. Hiatt  
Special to CW

FLORISSANT, Mo. — To cut energy costs and conserve power in its distribution centers, Wetterau Inc., a food wholesaler for an independent voluntary group of supermarkets, recently added a remote power management capability to its data communications network.

The economics of energy conservation require that savings, in the long run, exceed the cost of saving the energy. This rule was a decisive factor in Wetterau's decision to combine power management functions with an existing distribution center terminal network.

By upgrading the existing system with multiport modems, it became possible to operate both the 4,800 bit/sec synchronous data terminals and the new 150 bit/sec asynchronous power control terminals over the same point-to-point dedicated lines. No expensive multiplexing equipment or additional phone lines were required.

With power management, Wetterau, from its DP center here, can monitor and control energy use in the company's remote distribution centers. Energy savings to date at these centers range from 10% to 15%.

#### Multiport Modems Installed

The original terminal system used an IBM 370/158 CPU and 3705 line controller. Synchronous IBM 3780 terminals at the warehouses communicated with the CPU via leased full-duplex lines and 4,800 bit/sec modems. The terminals handle such functions as inventory management, order invoicing, payrolls and shipping orders.

Hardware for the power management system includes an IBM System 7 processor at the central site and power control terminals at the warehouses. In addition, the 4,800 bit/sec modems used in the original terminal system were replaced by 16 Modem 96 Multi-Modes from Racal-Milgo (ICC).

The 96 Multi-Mode is a 9,600 bit/sec modem capable of single-channel or multiport operation. It can combine and transmit over a single circuit a

combination of 2,400, 4,800 and 7,200 bit/sec channels, up to a total of 9,600 bit/sec, each with a simulated independently controlled carrier. A front panel switch allows an operator to select the desired multiport configuration.

Wetterau currently uses both a 4,800 and a 2,400 bit/sec channel on each

modem. The IBM terminals operate over the 4,800 bit/sec channel, while the 2,400 bit/sec channel is used to handle asynchronous 150 bit/sec data from the custom-built power control terminals.

The asynchronous 150 bit/sec data (Continued on Page S/20)

### Automated Net Control Reduces Outages

By Ken Coleman  
Special to CW

The overall philosophical rationale for justifying, designing, installing and maintaining data networks has usually been associated with increased user productivity. Companies with small networks normally have little problem with this notion; however, larger networks often require a separate function to manage them.

Network management is the overseeing of day-to-day communications activities; the analysis for optimization and/or reconfiguration of a network;

and the planning for network migration, consolidation and future installations. In many cases, these functions have grown to the point of justifying a full-time effort into network management.

With the introduction and development of statistical multiplexing, intelligent terminals and sophisticated line protocols, network management has become an important concern for even the user of a small data network. This does not mean that every organization must pay upwards of \$200,000 for a well-equipped technical control center.

Nor does it mean that networks will become unjustifiable based on cost or unmanageable because of complexity. A look at existing technical control centers tells why.

Much of the justification for technical control centers hinged on two factors: increased user uptime and tighter control on vendors. There is a good possibility that these criteria may have been erroneously appointed.

Taking the second point first, the vendors have gotten more sophisticated and subsequently more intelligent (Continued on Page S/14)

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## Implementation No Problem

# Shared Insurance Net Could Reap Big Savings

By Ivan T. Frisch  
And by Wen Hsieh  
Special to CW

Few people doubt the need for improved two-way terminal-computer communications between a property and casualty insurance company, its field offices and its independent agents. It would seem equally obvious that the concept of many major companies and independent agents sharing costs in an expanded and cooperating network would result in low costs and efficient exchange of information.

When it comes to the question of exactly how much lower such costs would be, however, intuition fails as a tool. For this reason Network Analysis

Corp. (NAC) was engaged by the Electronic Processing Implementation Task Force (EPITF) Systems Committee to evaluate the feasibility of a shared communications network in the property and casualty insurance industry and to examine the cost-performance tradeoffs for various telecommunications strategies and architectures.

To perform these analyses, certain basic reasonable hypotheses were adopted — assumptions that were made with the agreement of EPITF — regarding the number of potential participants in an optimized network and the resulting level of traffic. These were:

Number of companies: 24.  
Number of company field offices: 1,000.

Number of cities with field office locations: 50.

Number of independent agents: 10,000.

Number of independent agent locations: 350.

Traffic level: 440 kbit/sec peak hour or 20 billion char./mo or 114 transaction/agent/day.

These assumptions were not arbitrary guesses on NAC's part. They were derived from discussions with key companies, reviews of previous studies made by both EPITF and its other consulting firm, Stanford Research Institute, and detailed traffic survey questionnaires sent to major companies using independent agents, which account for 80% of the projected traffic.

Further assumptions were: the average agent communicates with six com-

panies; agents are geographically distributed in accordance with general population densities; the 50 field office cities are the 50 largest in the U.S. (Secondary assumptions were made regarding average message sizes, hardware costs, line tariffs, the sizes of representative companies, field offices and agencies, etc. These are not detailed here for sake of brevity, but the specific assumptions are available to interested parties.)

### Strategies Posed

From this point we posed and investigated various telecommunications and business strategies. We also investigated scenarios of different levels of agency-company interaction and field office utilization. This was done using NAC's interactive computer networking analysis programs, which compared various types of agent-headquarter communications systems. (Continued on Page S/26)

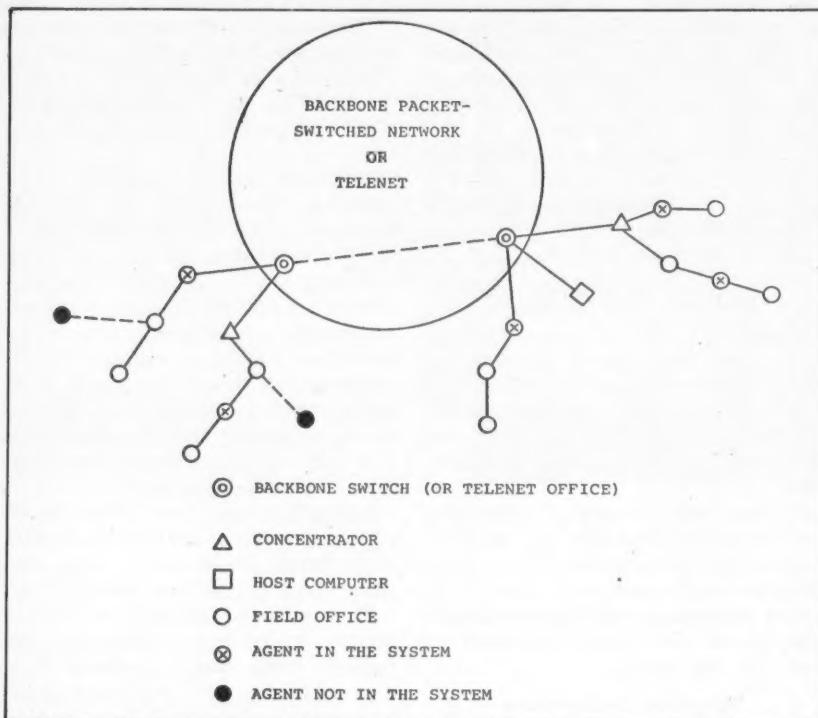


Figure 1. The above represents the total integrated system architecture.

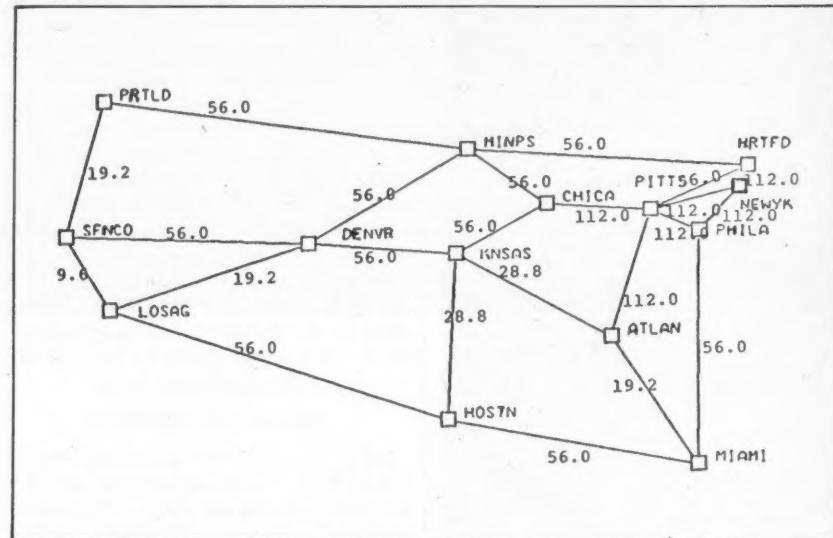


Figure 2. The numerals indicate the link capacities in kbit/sec.

System Characteristics	Design #1	Design #2	Design #3	Design #4	Design #5	Design #6	Design #7
A. Participating Companies	All 24	All 24	Top 5 Excl.	All 24	All 24	All 24	All 24
B. Participating Agents	Top 2,500	Top 2,500	Top 2,500	Top 2,500	None	All 10,000	Top 2,500
C. Terminal Compatibility	Compatible	Not all	Compatible	Compatible	Compatible	Compatible	Compatible
D. Backbone Network	Private P/S	Telenet					
E. Transaction Level (Billions of characters/Mo.)	20	20	11.8	40	20	20	20
F. Number of Terminals in System	4,554	4,554	3,882	5,580	3,000	11,000	4,554
<b>System Cost</b>							
G. Total Communication Cost (G=H+I) (\$K/Mo.)	822.9	906.9	697.8	992.2	524.4	1658.8	1110.6
H. Backbone Cost (\$K/Mo.)	150.5	150.5	112.3	221.6	150.5	172.4	172.0
I. Local Access Cost (\$K/Mo.)	672.4	756.4	585.5	770.6	373.9	1486.4	938.6
J. Terminal Cost (\$K/Mo.)	1138.5	1138.5	970.5	1395.0	750.0	1700.0	1138.5
K. Total System Cost (K=G+J) (\$K/Mo.)	1961.4	2045.3	1668.3	2387.2	1274.4	3358.8	2249.1
L. Communication \$/1000 char. (L=G/E)	.041	.045	.059	.025	.026	.083	.056
M. Total \$/1000 char. (M=K/E)	.098	.102	.141	.060	.064	.168	.112

Table 1. The above chart summarizes the integrated system designs.

## Use Statistical Techniques

# Intelligent TDMs Boost Network Utilization

By John M. O'Neil

Special to CW

Thanks to the relatively mature state of the microprocessing art, a new generation of time division multiplexers (TDMs) has evolved. These are generally classed as intelligent TDMs and their most immediate attraction is the significant improvements in network utilization they offer. The intelligent TDM provides to the network the efficiencies of a concentrator, while maintaining the network transparency of a hard-wired TDM in a cost range just above that of the hard-wired TDM.

The intelligent TDMs accomplish greater network efficiencies by taking

advantage of network utilization statistics. If we regard a "circuit" as the path between a terminal and a CPU port, we can view its usage from three different levels:

- The statistics of circuit usage. This defines the dimensions of the periods of complete connection between a terminal and its CPU port. These vary from the occasional-use terminal, such as in time-sharing applications, to the full-period dedicated terminal.

- The statistics of data activity. This describes the periodicity of data transmissions on a connected circuit. Keyboard entry represents the low end of the data activity range and the high end includes devices that transmit data continuously without interruption, as in the case of the high-speed aggregate output of the TDM itself.

- The statistics of language usage. These are based on the usage frequency of individual characters within a character set. Morse code, for instance, has a set of 50 characters (26 letters, 10 numbers, 14 punctuation marks and operational characters).

The length of each coded character is inversely proportional to its frequency of use in English language text, such that the code symbols for the letters E and T have one signalling element, whereas the code symbols for punctuation marks have six signalling elements.

Three multiplexing techniques are used in intelligent TDMs, relating directly to the three levels of usage. Each has its own characteristic advantages and disadvantages.

### Adaptive Multiplexing

Adaptive multiplexing, or bandwidth contention, takes advantage of the statistics of circuit usage. This technique provides a multiplexed channel on a demand basis for each individual circuit. The multiplex channel exists on an end-to-end basis only when the terminal-to-computer circuit is active.

Otherwise, that portion of the composite data stream it occupies when active is available for other circuits.

The end-to-end multiplex channel is provided on the basis of control signal indications (most generally EIA RS-232C controls) or on the basis of specific "channel request" data characters. The outstanding characteristic of adaptive multiplexing is that the multiplex channel is dedicated to the terminal-to-computer circuit during the period of its activity and that activity on other circuits through the multiplexed path will in no way delay or disturb it.

Adaptive multiplexing is therefore a nonblocking mode of transmission. Because the channel is dedicated and since there is no data manipulation, the adaptive multiplexer is completely code-transparent and can transmit all the standard code sets and also random data patterns such as those of the National Bureau of Standards encryption system.

Propagation delays in adaptive multiplexing are relatively short, in the range of hard-wired TDMs, and the delay is fixed so that the data transmission does not take on a "bursty" characteristic. The proportion of the high-speed data stream occupied by the channel when active is also fixed and is either equal to (for synchronous channels) or less than (for asynchronous channels) the data rate of the circuit.

During periods of peak traffic, active circuits may occupy all of the available high-speed data "bandwidth." Other circuits which request a channel are either put in a camp-on queue, busied-out or not answered, depending on network application.

### Statistical Multiplexing

Although all three multiplexing techniques used by intelligent TDMs are statistical in nature, the term "statistical multiplexing" has come to

mean the technique that operates on the statistics of data activity.

On a typical active circuit, there are periods when no data is being transmitted, such as between keystrokes in a manual entry circuit or between ACK/NAK transmissions on the return path of a bisynchronous circuit.

In statistical multiplexing, only active data is transmitted. This data is formed into packets, together with channel address information and error-protection coding. The packet length is variable from system to system and is very much applications-oriented.

For instance, where propagation delay is important, the packets are kept relatively short, perhaps 32 characters or bytes. There is also the requirement to transmit "short packets," such as the last few characters of a typed line. The intelligent TDM must therefore monitor all data transmissions in search of packet-terminating characters.

Statistical multiplexers are transparent to the standard code sets but their use is limited in random-pattern transmissions since packet terminating characters are generally unidentifiable.

Since the packets consist of channel-addressing information and error-protection coding as well as data, the proportion of the available high-speed aggregate data stream occupied is somewhat greater than the circuit data rate, with the actual proportion determined by packet length.

Propagation delay in statistical multiplexers is greater than that of adaptive multiplexers. It is at least as long as the packet length. However, as traffic activity approaches its peak, the delays become longer and variable since the packets from many channels must contend for "space" on the high-speed aggregate data stream. During the high activity periods, the data transmission becomes very "bursty" because of uneven propagation delays.

(Continued on Page S/28)



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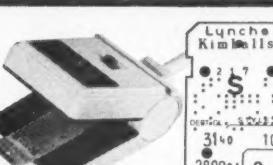
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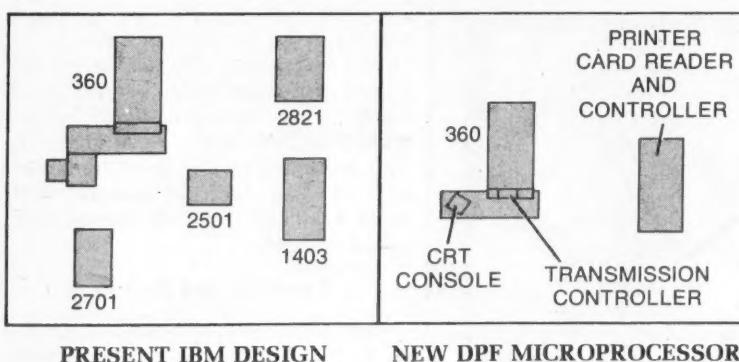
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# Distributed DP Can Upgrade Centralized Nets

By Anthony J. Alcorn

Special to CW

Nework analysts and managers are eyeing distributed processing concepts as a means of upgrading or adding new applications to their systems. The problem is that to upgrade existing centralized networks, many of these concepts require extensive systems redesign involving uncertain cost and high risk.

There is, however, a class of distributed processing functions that blends naturally and inexpensively into most existing transaction-oriented teleprocessing systems. Two functions in this class are Local (to the terminal) Format Storage (LFS) and Queued (at the terminal) Transaction Handling (QTH).

These functions remove formats from line traffic (as much as 80% of the total traffic) and keep remote terminal operations productive when the "host" or the communication lines are down. Beyond these advantages, LFS and QTH save money, improve performance and provide a solid platform for future implementation of other distributed processing concepts.

Typical centralized teleprocessing systems used in high production, transaction-oriented applications consist of three major elements: the host CPU, a network of telephone lines (nominally operating at 1,200 bit/sec to 4,800 bit/sec) and remote terminals capable of network protocol and key-stroke/display processing. Such systems typically have data format messages transmitted from the host to the remote terminals and transaction data, entered at the terminals, being transmitted to the host. There may also be considerable print traffic.

The advantage of LFS and QTH is that some gross design inefficiencies built into most of these systems are corrected without redesigning and rebuilding the system.

LFS aids in unclogging the network lines. Transmitting screen formats containing no useful information

wastes up to 80% of the network line capacity. Using LFS most of this waste is eliminated by replacing lengthy format messages with short format identification messages and storing the formats themselves at the remote terminal. Typically a reduction of 1,000 characters to 30 characters per message is realized.

QTH, on the other hand, in addition to freeing the CPU for more productive work, provides flexibility and the much needed backup when the network lines or the host have a failure.

## Growing Pains

Many networks installed in the past are now experiencing excessive loading and demands for higher performance by the users. An example is a large manufacturing company whose data network is reaching saturation on a daily basis and is causing complaints about the system response time.

The company runs a nationwide system with about 300 terminals interfacing over 2,400 bit/sec lines to an IBM 370/168. A brief data traffic analysis showed that an average transaction involves transmitting a 600-character format to the terminal and returning a 250-character message to the host.

The DP manager has three choices: upgrade most 2,400 bit/sec lines to 4,800 bit/sec, use additional multidrop lines or use an LFS system. The three options were compared using a multidrop line performance prediction program.

After verifying the accuracy of the prediction tool, by comparing predicted vs. actual performance for the present system, the performance for each option was determined and plotted as shown in Figure 1. These curves show that LFS provides superior performance. Equally important, however, LFS is the least costly to implement. In fact, the presently leased terminals can be replaced with terminals having LFS at little or no extra cost. The only other cost would be a two

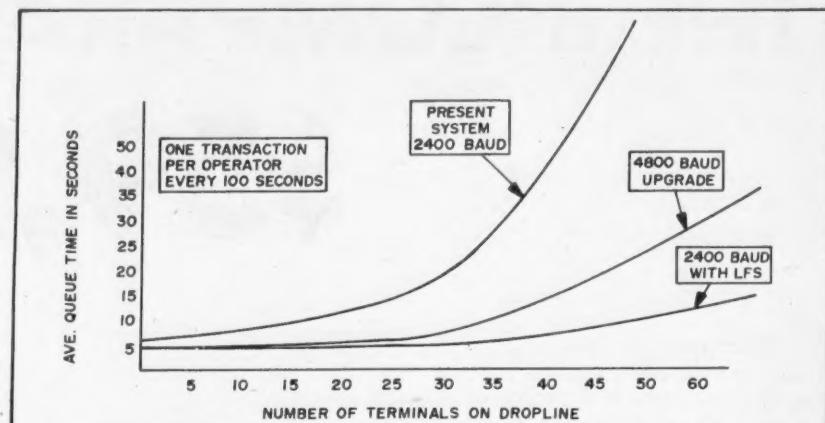


Figure 1. Shown here is a comparison of performance of three options to expand network capacity.

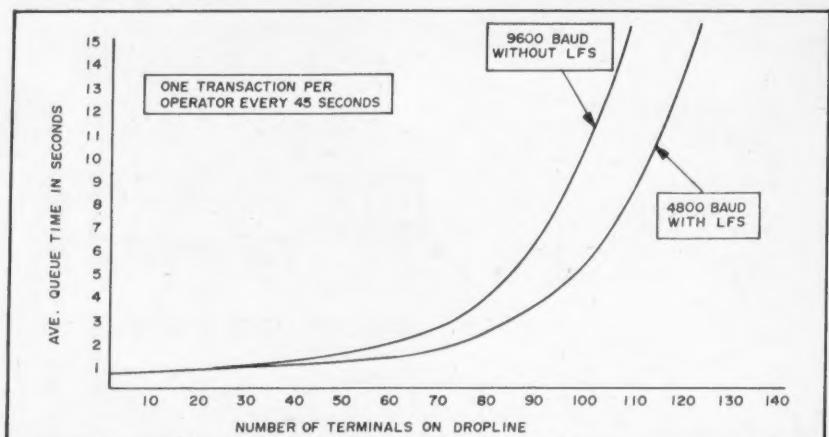


Figure 2. This shows predicted dropline performance at 9,600 bit/sec (referred to here as baud) without LFS and 4,800 bit/sec with LFS.

man-month effort to reorganize the host format files — a fraction of the cost of upgrading to 4,800 bit/sec or adding new multidrop lines.

A more dramatic example of network cost savings achieved with LFS is an ongoing network design in which 1,000 terminals distributed nationwide are to be interfaced to twin 370/168s. The application is presently handled on a remote job entry basis with decision makers preparing source documents and key-to-tape operators key-

ing in the data for batch transmission to the 370/168. In moving from a batch to a real-time system, the data entry operators will be replaced by the higher paid decision makers, placing tough requirements on performance.

The initial design, which met the specified performance requirements, interfaced conventional terminals over 9,600 bit/sec multidrop lines to regional concentrators and then on 19.2 kbit/sec lines to the host. Using LFS, formats are stored at the remote sites, with the result that the average message length on the network drops from 425 characters to 180 characters.

More important, this allows the required performance to be met with 4,800 bit/sec instead of 9,600 bit/sec multidrop lines as shown in Figure 2. This reduction in line speed translates to a 30% reduction in network costs (over \$250,000 per year for the proposed system).

## Flexibility and Backup

A significant aspect of QTH is its use as a much needed backup during periods of host or network line failure. Under such conditions, QTH allows operators to enter data into storage media local to the terminal. Such transaction files are then transmitted to the host when the host and/or network resume operations.

The flexibility of QTH allows remote terminal operators to interact with the host on-line or to interact locally with the terminal off-line. This significantly improves operational efficiency.

For example, a telecommunications manager may have a network supporting applications having different priorities such as critical real-time inquiry/response, less time-sensitive data entry and administrative mes-

(Continued on Page S/29)

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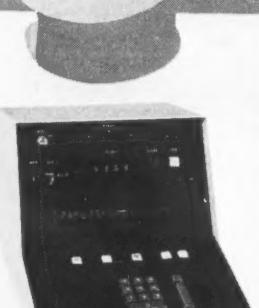
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For Lower Connect Costs

# Public Packet Net Services Expanding Overseas

By Robert B. Field  
Special to CW

The year 1977 has seen the rapid expansion of public packet network services from the continental U.S. to overseas. Nearly 20 major international locations are now served by packet network services offered by the foreign postal, telephone and telegraph (PTT) authorities in conjunction with the U.S. international record carriers (IRC) and the domestic packet network carriers Tymnet, Inc. and Telenet Communications Corp.

Packet network services provide inexpensive, highly reliable connections between users' terminals and computers interfaced to the networks. Typical uses include virtually all applications of interactive time-sharing and data base access.

At present, services have been announced for 110- to 300 bit/sec terminals and costs for typical users vary from about \$7 to \$42 per terminal connect hour. The countries with the higher charges generally include toll-free dialing from all major cities within that country.

In addition, some administrations charge a minimum connect fee, a subscription fee and a flat monthly charge for each user name.

In the past, data communications from international locations was, at best, an expensive proposition. Terminal users placing overseas calls paid approximately \$200 per terminal hour to access U.S. computers. In many locations, calls had to be placed up to a day ahead of time.

Noisy circuits were also prevalent. The only alternative was to buy a voice circuit and install customer-oriented and operated modems, multiplexers or concentrators. The direct costs gen-

erally ran between \$10,000 and \$18,000 per month and made this impractical for any but the largest users.

## History of Expansion

Initial international expansion actually started in 1976 when Tymnet signed agreements for connection to neighboring countries with the Trans-Canada Telephone System (TCTS) in Ottawa and CONACYT in Mexico City. TCTS now has two Tymnet nodes providing terminal access (Tym-sats) in Edmonton and Toronto. These

connect to DataRoute service and link Calgary, Vancouver, Ottawa and Montreal to the network.

CONACYT, the Mexican government's science and technology organization, has a Tymnet in Mexico City, with plans to expand to Monterrey this December. In addition, it has several computers connected to Tymnet in Mexico City.

Intercontinental expansion started in February 1977, when Western Union International (WUI) and the British Post Office (BPO) agreed to install a

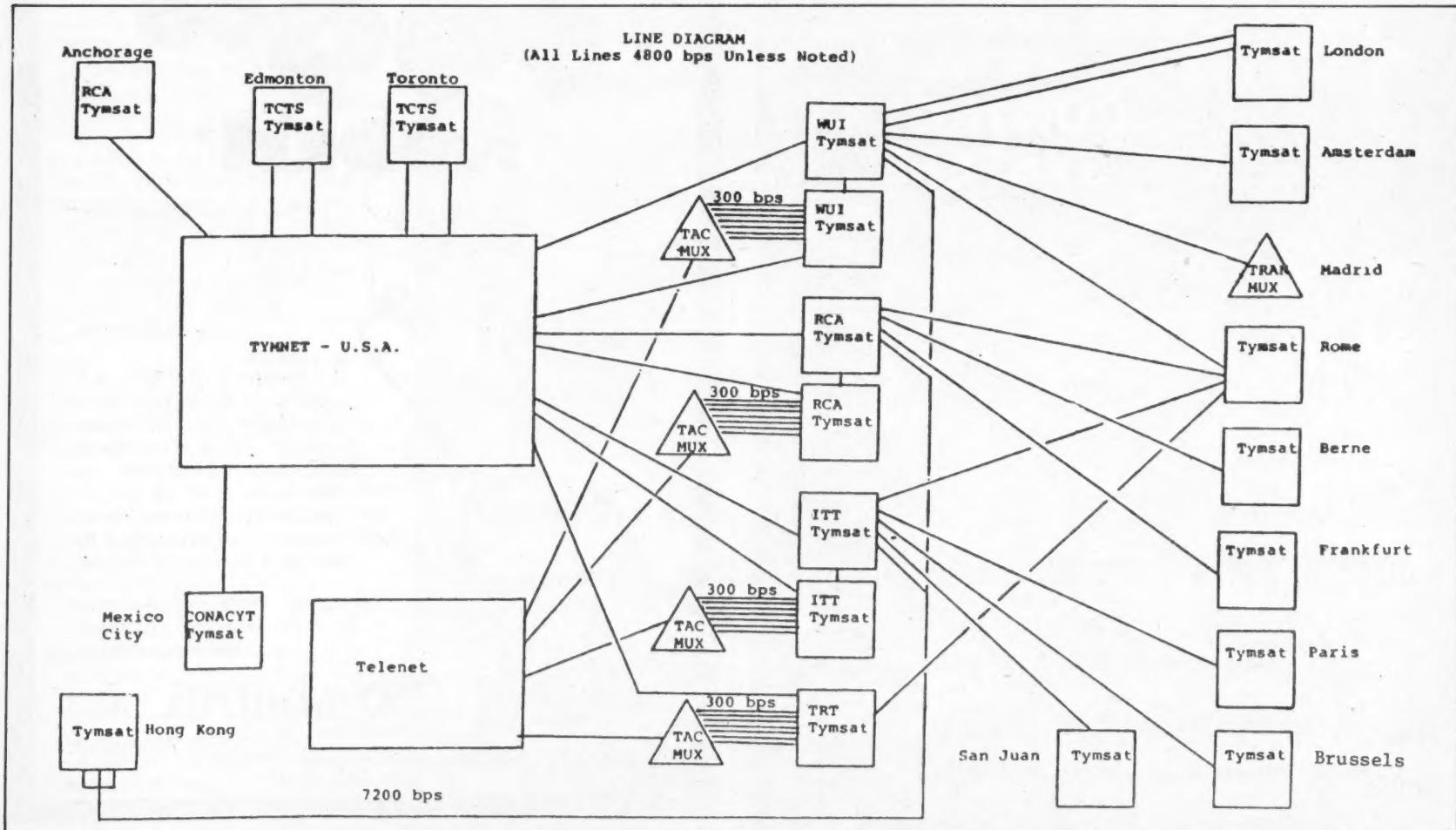
Tymnet in London and connect to a WUI node provided by Tymnet in New York City. From the beginning, usage from the UK to the U.S. host computers has exceeded expectations.

In April, the French Postal Telephone and Telegraph and ITT World Communications, Inc. installed a Tymnet in Paris, France. In addition, a Tymnet was installed in San Juan, Puerto Rico. These nodes were interconnected to another Tymnet-provided node at ITT Worldcom in New York City.

(Continued on Page S/32)

Node Location	Local Access	IRC Agency	Equipment	Approximate Hourly Cost 30 Char./Sec Terminal
London	London	WUI	TYMSAT CP30R	\$22.56
Paris	France	ITT	TYMSAT CP64R	\$19.72
Berne	Switzerland	RCA	TYMSAT CP64R	\$35.23
Madrid	Madrid	WUI	TRAN MULTIPLEXER	\$20.80
Brussels	Brussels	ITT	TYMSAT CP64R	\$27.85
Amsterdam	Amsterdam	WUI	TYMSAT CP64R	\$19.72
Frankfurt	Germany	RCA	TYMSAT CP64R	\$42.70
Rome	Rome	RCA	TYMSAT CP64R	not announced
		ITT		
		WUI		
		TRT		
San Juan	San Juan	ITT	TYMSAT CP64R	\$19.72
Anchorage	Alaska	RCA	TYMSAT CP30R	not announced
Hong Kong	Hong Kong	ITT	TYMSAT CP64R	\$24.96
		RCA		
		WUI		
Mexico City	Mexico City	CONACYT	TYMSAT CP30R	\$13.16
Edmonton	Edmonton	TCTS	TYMSAT CP30R	\$7.24
Toronto	Vancouver			
	Calgary			
	Toronto			
	Ottawa			
	Montreal			
		TCTS	TYMSAT CP30R	\$7.24

Typical Costs for International Access



International Locations Served by Packet Network Services

# CCITT Codifies Data Multiplexing Schemes

By Sherban Popovici

Special to CW

Telex service, which became widely used internationally after World War I, provides a backbone of data communications for many governments and private entities, particularly in the developing nations.

Since Telex provides dial-in teletypewriter hard-copy service between subscribers, with the added advantage that the answering terminal can be unattended, it offers a convenient channel for users to access low-speed computer ports, particularly in those situations where a computer transaction may have a long delay.

At present, most Telex terminals are of the 50 bit/sec, 5-bit Baudot code type, with 75 bit/sec also being used in recent years. Since the data transmission capacity of a telephone line can be as high as 9,600 bit/sec, the Telex authorities, or users with large numbers of terminals themselves, employ time division multiplexers (TDMs) to combine the low-speed data streams and transmit them over a single high-speed facility. It follows that efficient multiplexing is crucial for distributed Telex networks.

In recognition of the growth of Telex traffic the CCITT, the consulting body that sets international communication standards and protocols which are usually also used internally by most member nations, adopted recommendation R101A codifying Telex transmission protocols at 50 bit/sec and 75 bit/sec, as well as the multiplexing of

the terminal data streams.

The CCITT also recognized the growth of computer transactions and computer networks and so set another recommendation, R101B, that accepted terminal rates up to 300 bit/sec and codes other than Baudot, in particular 8-bit ASCII. The multiplexing scheme for the resulting heterogeneous mix of speeds and codes was also included in R101B.

Recommendation R101B offers a more efficient multiplexing scheme than R101A. For example, while R101A allocates two 50 bit/sec channels to each 75 bit/sec data stream, effectively squandering 25 bit/sec bandwidth in the process, R101B allocates bandwidth on the aggregate on a more flexible basis. A 2,400 bit/sec high-speed aggregate can carry only 23 75 bit/sec channels multiplexed according to R101A, while R101B can accommodate 30 75 bit/sec channels. Figure 1 shows a conceptual diagram of the scope of both recommendations.

The adoption of R101B provided an impetus for networks that would accommodate the simultaneous multiplexing over high-speed lines of both conventional Telex and the higher data rates set by R101B, and go further in accepting the transmission rates employed by the more recent terminals and remote job entry units now in use, such as 1,200 bit/sec asynchronous and 2,400 bit/sec and 4,800 bit/sec synchronous.

Recently an advanced design TDM that is particularly suited for data/

telex networks has been introduced in world markets. The unit accepts up to 96 input "low-speed" channels operating at 5-, 6-, 7- or 8-bit code and at any asynchronous rate to 2,400 bits/sec. Synchronous rates that are a submultiple of the aggregate data rate are also standard. For example, a high-speed transmission rate of 9,600 bits/sec permits the operation of a 4,800 bit/sec terminal.

The networking capability of the unit is further enhanced by its "bypass" feature, which allows the multiplexed data streams from one remote TDM to be merged with those from another remote TDM and share the transmission

(Continued on Page S/28)

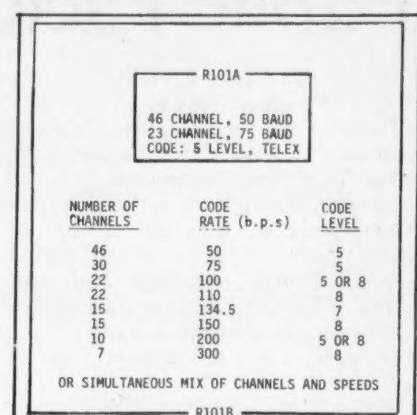


Figure 1. Schematic of Scope of CCITT Recommendations.

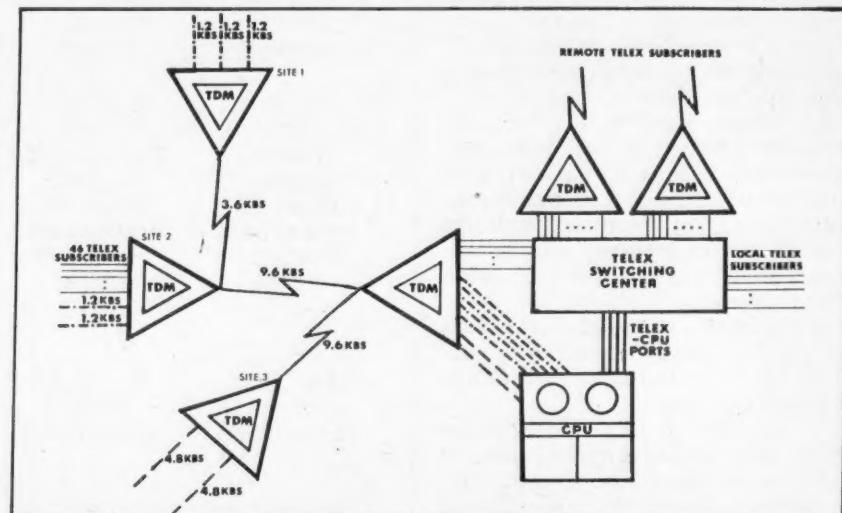


Figure 2. Data/Telex Network

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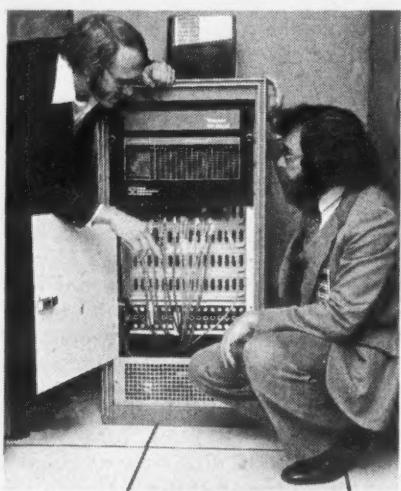
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## At Virginia User Site

# Micro-Based Telenet Interface Up and Running

The first microcomputer-based processors designed to interface computers and terminals to the nationwide Telenet packet network are running at American Management Systems in Arlington, Va.

The communication processors are the result of a three-year development effort at Telenet and are being made available for on-site customer installation this fall. Designed as plug-in interfaces to the network, the units re-



Checking over the TP-2000 are Harold Tranter (left) and Tom Martin of AMS.

quire no changes in customer hardware or software and feature statistical multiplexing, end-to-end control and remote diagnostic and control software.

The first two models, the TP 1000 host/terminal interface concentrator and the TP 2000 host interface processor, were tested over an eight-week period in the Computer Services Division of AMS. The first AMS clients were tied into the processor via Telenet with virtually no interruption of normal service, according to AMS Vice-President Tom Martin.

AMS decided to connect its IBM mainframes and Memorex 1380 front-end processors to the Telenet network in December 1976 rather than extend its own private network. Having immediate nationwide access is critical for the company, which markets interactive computer applications on both IBM and DEC equipment to government agencies and corporate clients with multiple office locations.

The public network is also used internally by other AMS regional offices scattered throughout the country for the company's consulting and systems development activity. AMS plans to eventually eliminate use of its own network and utilize Telenet to concentrate all of its data traffic, Martin said.

Initially AMS installed a conventional multiplexer to interface remote users over the Telenet network.

### Main Incentives

According to Martin, the main incentives for converting to a TP 2000 were the overall benefits of the unit's CCITT X.25 protocol, which assures virtually error-free transmission, and its capability of handling all asynchronous terminal speeds on a single rotary. "Telenet essentially delivers us a stream of Ascii characters, relieving us of the problems related to man-

agement of terminal types, speed and error checking," Martin said.

The TP flow control feature permits the AMS computers to communicate to the Telenet network at 1,200 bit/sec, while terminals at the remote end operate at any speed from 75 bit/sec to 1,200 bit/sec. The network performs a throttling function, in cooperation with the Memorex 1380, to adjust for differences in speeds at each end of a connection. By interfacing to the Memorex 1380 at 1,200 bit/sec, instead of 300 bit/sec, propagation delays over the asynchronous host connections are significantly reduced.

"The result should be a noticeable improvement in response time," Mar-

tin said.

Martin believes, in the long run, the TP 2000 will prove more economical than the multiplexer previously used. AMS' present costs for the TP 2000 and 12 1,200 bit/sec ports run \$1,090/mo plus \$320/mo for a 4,800 bit/sec access line from Arlington to the closest Telenet central office in Washington, D.C. The multiplexer alternative with 10 300 bit/sec and one 1,200 bit/sec port costs \$1,140/mo including a 4,800 bit/sec access line to the Washington central office.

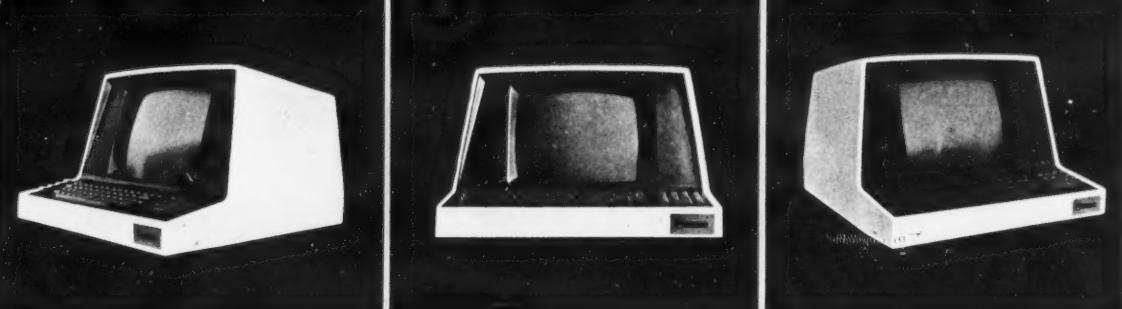
However, the TP 2000, which uses statistical multiplexing techniques, will permit the company to support additional terminals without increas-

ing circuit capacity. According to Telenet, the new units will support over twice as many terminals per circuit as a conventional multiplexer.

The comparatively lower costs of adding 1,200 bit/sec ports is another benefit in the long run for Martin, who added that "we're seeing a tremendous increase in demand for 1,200 bit/sec access."

AMS will be able to add four additional 1,200 bit/sec ports to the TP 2000 at \$80/mo, whereas the company's cost to add four 1,200 bit/sec ports to the current multiplexer configuration would be about \$520/mo including the circuit speed upgrade required.

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# Dispersed System Cuts Client Insurance Costs

AMARILLO, Texas — Corporate Systems here is a company that specializes in helping other companies analyze and manage risk factors in an effort to reduce insurance costs.

Through the use of computer techniques, Corporate Systems has been able to slash the cost of insurance for its clients by as much as 30%, a significant savings for many companies whose annual insurance bills may run into the millions of dollars.

To communicate more effectively with its clients and provide more rapid collection of data relative to risk situations, Corporate Systems has developed a dispersed processing network which extends to most sections of the U.S. The dispersed processing network is based on two

Datasheare business time-sharing systems from Datapoint Corp.

The two central processors for these Datasheare systems, Datapoint 5500 business processors, are located in Corporate Systems' offices here. From that location, each of the 5500s will provide on-line computer power to up to 16 3600 video display workstations situated in client offices.

Leased or dial-up telephone lines provide the communications link between the terminal units and the central 5500 systems.

When data is transmitted to the 5500 processors from workstations in the network, the data is collected on magnetic tape units associated with the systems. These tapes are then transferred to Corporate Systems' central

IBM 370 system, where the data they contain is used as the basis for the development of special risk management reports.

## Management Reports

Programs in the Corporate Systems proprietary library are used to develop a range of management reports that help a client company's financial managers and insurance representatives do a better job of purchasing insurance.

Reports cover the areas of casualty risk management, loss control and safety analysis, property and special risk management, claims and expense management, retro-trend (for managing retrospective and loss-rated premiums) and Osha recordkeeping for

employee injury and illness data. Based on data supplied to the central system by the dispersed processing network, these programs can provide, on a weekly or even more frequent basis, those reports needed to make wise insurance purchases.

Clients for the Corporate Systems service include insurance brokers, insurance companies, government agencies and large corporations. All told, Corporate Systems is now providing its service to approximately 250 clients, who in turn represent about 800 other companies. Those clients handling the greatest volume of risk management data have on-site workstations that can be used to enter data to the dispersed processing network.

The data entry terminals utilized at client sites are Datapoint 3600 video display workstations with which operators can immediately display data as it is entered from source documents.

According to Don Riggs, vice-president in charge of Corporate Systems' computer operations, the screen display has played an important part in the reduction of input errors.

"Entry formats are displayed on the screen of the workstation for each application, thus providing for more accurate entry of data," he explained. "Since these formats 'guide' the operator through all the steps and procedures involved in any of the various applications, training time has been kept to a minimum. In fact, operators hired by our clients can usually master any particular data entry operation in an hour or two," he said.

Operators at the workstations convert data from source documents such as premium payment stubs, claims applications and policy coverage changes and adjustments. The claims data, converted and transmitted to the central computer facility, may relate to worker's compensation claims, fire and theft losses, property damage or other business hazards.

Guided by programs lodged in the host processor, an operator at the workstation can also set up claims, change reserves, add payments, change claims status, update systems design, maintain premium files and verify the entered data. Because the 5500-based Datasheare systems are time-sharing systems, operators at the display units can access a variety of programs independently and simultaneously, depending on individual work assignments.

## Forms Reduction

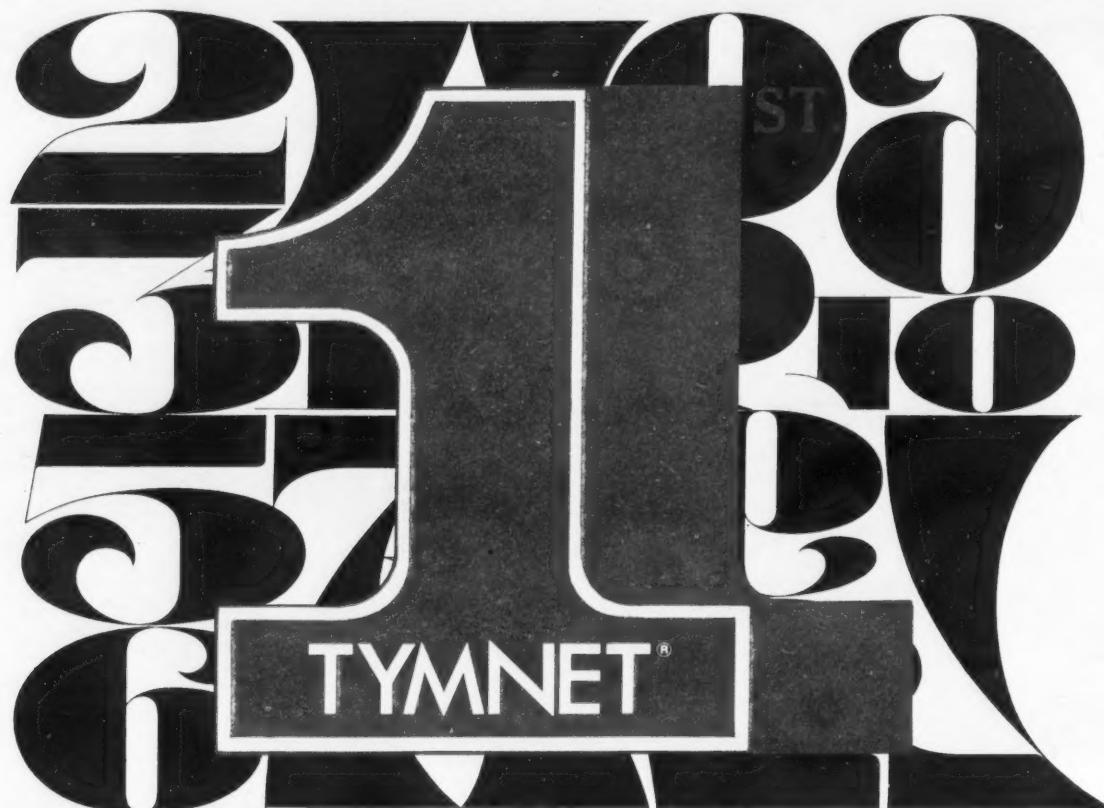
Corporate Systems and its clients have enjoyed other advantages with their dispersed processing network.

"We have eliminated the costly and arduous task of filling out forms manually," Riggs noted. "This job previously required a lot of clerical help. With the dispersed processing network, employee productivity has risen sharply and data entry errors have dropped significantly."

"Also, the computerized approach has reduced the amount of space that clients heretofore needed to store bulk paper records," he said.

Another advantage of the network is that operators in client offices may use their workstations for on-line retrieval of information that is stored in mass memory in Amarillo. For example,

(Continued on Page S/32)



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Consider these statistics about TYMNET, which in a typical day:

- utilizes over 265 intelligent, mini-computer nodes
- makes available over 2,500 access ports
- supports over 1,300 simultaneous terminal users
- services over 150 host computers
- carries approximately 300 million characters

TYMNET's success story is not accidental. It's based on long experience and sound planning, the use of advanced packet technology, plus an appreciation and understanding of the market for specialized data communications services, directed towards users whose network needs encompass time sharing, data base access, and message switching. These applications are distinguished by a large number of connections between

geographically dispersed, low-speed (1200 bps and below) terminals and a central computing facility. Typically such transmissions cannot be handled conveniently, reliably, or economically on standard communications facilities. But with Tymnet's existing, public packet network service users can take advantage of the operating efficiencies and economy of a national communications network designed specifically for these applications.

By incorporating the most advanced computer and communications technology in the network, Tymnet is able to offer its users a reduced operating cost plus a greatly improved communications facility.

Users of TYMNET benefit from:

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Domestically, TYMNET today provides access in over 130 cities — and the number of locations continues to grow. International operations can also be served by TYMNET, through interconnect agreements with the International Record Carriers which provide access in major world cities, from Rome to Hong Kong.

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## Converting From 'Paper Nets' System Eases DP Phase-In for Insurance Agents

By Thomas A. Harlan  
CW Staff

A stock phrase among insurance professionals is, "We have a paper business." However, current trends indicate that this condition will not continue. There is an increasing move toward utilization of DP techniques to eliminate the inefficiencies inherent in storage and transfer of data via paper records.

Efforts by the industry to create viable standards and to position DP technology in relation to the development of the needs and requirements of the insurance profession have resulted in a considerable amount of debate. What is needed is an approach that is sufficiently flexible to meet future evolutionary changes, but which is efficient when applied to today's problems.

One approach being taken today makes it easy for the independent insurance agent to incorporate a methodology which allows use of DP without enforcing rigid limitations. It provides for future modifications to suit users' changing requirements and is designed to allow the user to work easily with industry standards that may be de-

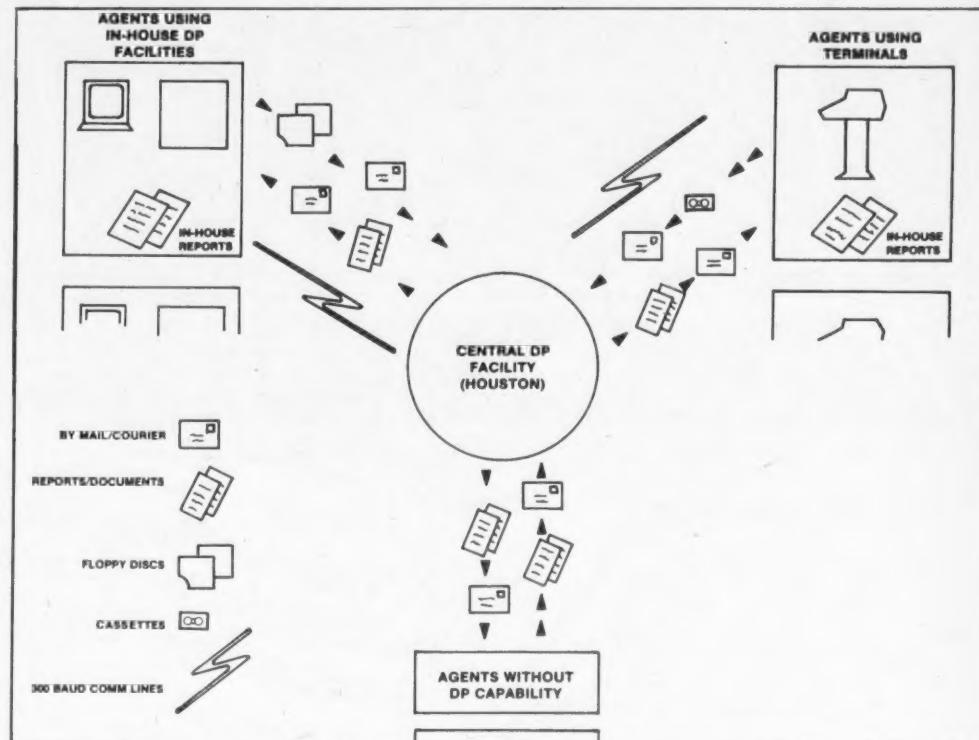
veloped in the future.

From a system point of view, it is a straightforward conversion of traditional insurance "paper networks" to data networks that increase in sophistication to meet demand. Each stage may be operated by insurance personnel, since minimal DP knowledge is required.

### Stages of Development

In the system provided by Independent Agent Center, Inc. (IAC), every user starts by using a batch-processing approach, regardless of the size of its operation. This procedure reduces difficulties sometimes encountered in transitions from manual bookkeeping to automated systems and shortens the time required for the transition. Because of the flexibility inherent in this approach, a transition to more sophisticated approaches (in-house DP and interactive operation) is facilitated as well.

In the batch approach, typed documents are received and input is either keypunched or optically scanned in Houston. Routines used in the batch processing include a variety of checks and evaluations of in-



A combination of written documents, floppy disks and 300 bit/sec (baud) communications lines are used in this system now in operation between Independent Agent Center, Houston, and agents in five states.

put data, so client personnel have the benefit of interaction with IAC specialists. This process helps make the transition from manual to automatic DP more efficient, with reduced error volume, even in early stages.

Increased sophistication is provided at the second level by utilization of a computer in the client's facilities. This processor includes a software array that provides immediate response to such everyday requirements as customer status, automatic document processing, rate information for preparation of policy quotes, etc.

Data is captured on a floppy disk and is relayed to IAC's central processor for generation of a backup data base and preparation of certain reports that have longer allowances for turnaround time. By utilizing a preprocessing stage to perform functions where rapid response is important, coupled with the use of a larger DP system capable of cost-efficient handling of detailed data analysis, users get cost efficiencies and operational benefits of two-level networking.

A third-level alternative that may be dictated by user's needs is the application of a data terminal with storage at the user site. This terminal allows off-line preparation of input data, rapid data transfer to the IAC mainframe and interaction between the terminal and central processing facility. Duplicate data bases provide redundancy for long-term file integrity.

Training in the utilization of this approach works from the

top down. By familiarizing top management with what will occur and what results are to be expected, a smooth integration is effected. Moving from one operating level to the next is a natural evolution, occurring when needed, and without significant change in

(Continued on Page S/16)

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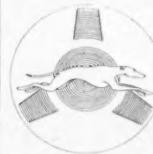
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# TNS Developed for Short Inquiry Applications

By George M. Dick  
Special to CW

AT&T has announced a special-purpose communications network called Transaction Network Service (TNS). This service, designed by AT&T, is currently tariffed by the individual Bell operating companies and, thus far, only the companies in the states of Washington and Minnesota have elected to offer TNS.

TNS has been designed as a complete system for short inquiry/response applications. Although the service can be used with customer-provided terminals, the Bell System offers three terminals (as separate products) that complement the functions of the service.

These terminals are also offered only by the individual operating companies; one of the terminals, as with TNS itself, is available only in Washington and Minnesota. All of the Bell terminals can interpret the information provided by the American Banking Association's magnetic stripe (track-two standard), and consequently, are geared toward financial applications at the present time.

The basic concept of TNS consists of a message control center (located on Bell premises) that is connected to remote terminals via low-speed asynchronous lines and to host computer sites via high-speed synchronous lines. The center is responsible for protocol maintenance, message switching, code and speed conversion, address interpretation, error control and general overhead functions such as network maintenance and diagnostics.

There are actually two categories of TNS, dial-up and polled, which are called Switched Telecommunications Network and Polled Access Network.

Dial-up telephones (including Touch-Tone and Transaction telephones as well as non-Bell units) access TNS through the Switched Telecommunications Network (STN) under existing tariffed telephone services. Messages are sent from the terminals in Touch-Tone format to a maximum of 10 char./sec. Response to the terminal can be voice response only, voice and keyed answer tone response or 150 bit/sec data response.

The keyed answer tone response is simply a tone designed to light an indicator lamp. The voice responses are composed by the customer's host computer through selection from a TNS vocabulary; size of the vocabulary is determined by each operating company.

Response mode limitations are determined by the terminal's capability. Telephones (terminals) with 12 Touch-Tone characters are limited to voice-only responses, while telephones with 16 Touch-Tone characters can receive any of the three response types.

Each terminal is connected to the Polled Access Network (PAN) through a shared telephone circuit (dedicated to TNS) known as a Polled Access Circuit (PAC). The PAN controls a polling sequence that allows each terminal access to the network.

The quantity of terminals allowed on a single PAC is not specified; however, access delay, defined as the time between completion of loading the terminal and the receipt of the beginning of the poll to that terminal, is designed to be less than 1.25 sec averaged over a

time-consistent busy hour of the busy season.

As with dial-up, the terminals can be Bell-provided or customer-provided. Because of the shared line configuration, polled service is available only in certain areas.

Polled terminals designed for use on the PAN are required to recognize the polling sequences and use the protocol and message format defined by the network. Text information, of course, is left to the customer. Transmission is asynchronous (half-duplex) at 1,200 bit/sec using the seven-bit Ascii information bits, a start bit, a parity bit and a stop bit.

The network is transparent to Ascii text information except for control characters. A tone or voice answer-

back will not be delivered to a polled terminal.

## Host Computer

The customer's host computer is connected to the network by dedicated full-duplex synchronous facilities at speeds of 2,400-, 4,800- or 9,600 bit/sec. The host computer may elect to offer service to only dial-up terminals, a restricted group (or groups) of polled terminals, all polled terminals or any combination of the three categories.

The host computer may also elect to accept messages from all other host computers or only from "affiliated" hosts. In all cases, the network will screen the messages to assure that only those messages that a host wishes to accept will be delivered.

All communications with the network are accomplished via Ascii with odd parity and control procedures in accordance with Ansi BSRX3.28-1971. Enhancements are included that make the data link control procedures compatible with the BSC procedures used by many systems today.

At the customer's option, the communications link may be analog or digital (DDS). Analog facilities are provided by Bell via its 201C, 208A or 209A data sets.

If the link is digital, a Data Service Unit (DSU) or Channel Service Unit (CSU) at the appropriate speed is supplied. The customer may elect to supply his own (Bell-compatible) modem.

(Continued on Page S/34)

# The \$6,000\* DP Center.



## IMSAI Introduces the VDP-80

Until now, owning real computing power meant paying unreal prices. Announcing the IMSAI VDP-80 Video Data Processor, a complete computer, intelligent terminal and megabyte floppy disk mass storage system. All in one compact cabinet. All for just \$5995.\* A complete desk top DP center.

For small business applications, the VDP-80 places a stand-alone computer at your fingertips. And, our full line of add-on peripherals, assures that the system can be expanded as your needs do.

For the large business user, with an existing central mainframe, the VDP-80 is the ultimate remote processor. You have the advantage of powerful local processing capability, plus the epitome in cost-effectiveness for implementing a distributed data communications network.

Take a close look at the following features. Then you'll know why we call our VDP-80 the desk top DP center.

**Powerful, High-Speed, Central Processor.** 3 mHz Intel 8085 microprocessor. 32K RAM memory (expandable to 196K). Parallel and serial I/O. Asynch, synch and bisynch communications. Programmable baud rates (.05-56 KB).

**Megabyte Mass Storage.** PerSci dual floppy, double density disk drive standard. One million byte storage capacity. Three floppy disk drives can be added-on, providing 4 million bytes of on-line storage.

**Drives Printers, Plotters, Terminals, Modems and Tape Drives.** Supports up to six terminals or modems, and four tape drives. Drives plotters, serial printers and line printers (up to 300 lpm).

### 12" CRT, 24x80 Field, User Programmable Font.

Character and line insert/delete allows fast program correction and text editing. Inverse video and programmable field allows highlighting or enlarging graphics of information display. Titled fields protect information blocks from being written over accidentally. Programmable font (up to 256 different characters) allows foreign language and special purpose character forms.

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62-pad main keyboard. Programmable 12-pad numeric keyboard. 12-pad control keyboard. Standard typewriter and calculator keyboard layouts. "N" key roll over reduces operator error during high-speed data entry.

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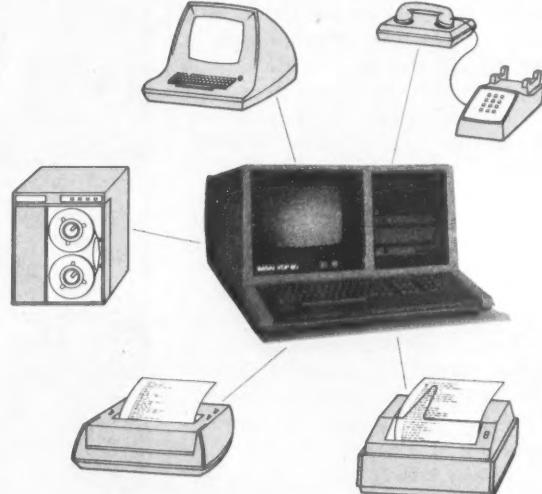
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# Diverse Standards Complicate Communications

(Continued from Page S/2)

Consultative Committee (CCITT) is an international body composed mainly of members of the Postal Telephone and Telegraph (PTT) organizations, which administer communications facilities and services in their respective countries. The CCITT establishes special study groups to develop and propose standards for all facets of communications including modems. Although these standards are not mandatory or binding, the majority of PTT administrations promote practices

## Control Centers Reduce Outages

(Continued from Page S/2)

since the late 1960s. It was not the constant embarrassment by customers through the use of complicated technical control centers which piloted the increase in vendor expertise. Rather it was the competitive nature of the industry and the easy flow of talented people throughout that has helped the industry to grow and "forced" the vendors into knowing what they are doing.

The idea of increased user uptime is a sensitive subject for many designers of technical control centers. In reality, the very nature of a technical control center tends to add to user outages.

The majority of the time, the equipment installed in a technical control center is used primarily to diagnose network problems. However, in doing so, care must be taken; a misinterpretation, miscalculation or mistaken switch setting can waste valuable time while someone chases erroneous symptoms.

This may not have been a problem when the particular control center was installed, but through employment turnovers, employee transfers and managerial promotions of the highly skilled individuals, the less qualified are forced to perform in this difficult situation. The net result is more outages (through mistakes) and more user downtime.

Through experience, the various vendors have learned not to react too hastily to a customer's analysis of a problem; they take the same repair steps regardless of the sophistication of equipment involved at the customer site. Therefore, the time spent carefully narrowing down the specifics of a failure usually only means added outage on the network.

The answer for future network management needs lies in the concept of automated technical control centers. With the increasing complexity of networks, these automated facilities require less operational/monitoring personnel, monitor all of the critical and testing functions, notify an attendant of a possible problem and suggest probable corrective actions for remedy. In many circumstances, a failure can be detected, diagnosed and repaired without the user even knowing anything was wrong.

When designed properly, the automated facility can provide the statistics needed to perform all of the tasks required for thorough and proper data network management.

*Coleman is a systems engineer with the Federal Reserve Bank in Chicago.*

which conform to CCITT standards. Thus, in Europe, as in many other parts of the world, the existing standards are CCITT compatible.

The existing Bell and CCITT standards for modems are mostly incompatible. That is, a user will normally not be able to obtain a Bell unit in the U.S. and communicate through a PTT-supplied unit in another country. There are, however, almost exact one-to-one functional equivalents in types between Bell units and CCITT units which are designated by a CCITT recommendation. Table 1 shows the relationship between types along with their basic functional characteristics.

The only speed at which compatibility does exist is at 2,400 bit/sec. The 201 modem is compatible with the

V.26 unit in the "B" modulation modem. (Recommendation V.26 includes two modulation modes designated A and B, with only the B mode being operable with 201 types. The B mode is becoming the "standard" V.26 mode.)

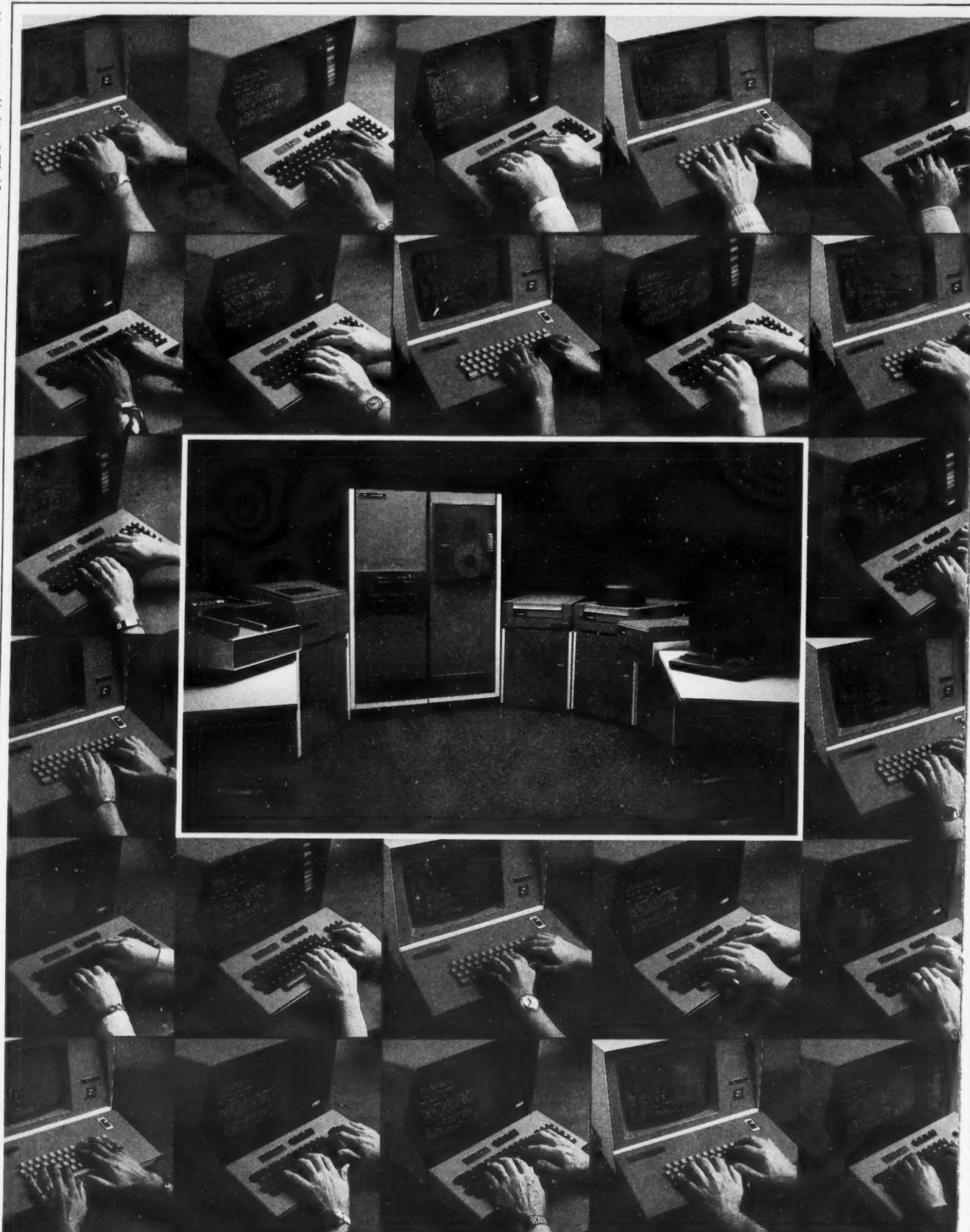
For the low-speed 300 bit/sec and 1,200 bit/sec asynchronous types and the higher speed units at 4,800 and 9,600 bit/sec no compatibility exists. The 103 and V.21 units use different base frequencies as do the 202 and V.23 types. At the higher speeds, the lack of compatibility is caused by differences in modulation types, scrambler patterns and by variations in the training sequences used in the automatic line equalization process.

Of course, modem compatibility is

not the only issue complicating international data communications. The U.S., as well as several PTT administrations, has various restrictions as to how data can be transmitted, especially when using dial facilities. It is essential that the user explore these limitations with the appropriate authorities before beginning.

CCITT-compatible and Bell-equivalent modems are available from several sources both domestically and outside the U.S. In the majority of instances, outside the U.S., the user is required to obtain modems from the PTT organization or use units which have received "type approval" from the PTT.

*Lowry is director of product marketing at Codex Corp., Newton, Mass.*



## Services of Six Banks in 26 Stores

# Supermarkets Gain Savings Bank Functions

ORLANDO, Fla. — A network of customer-operated terminals in 26 Kash 'N Karry supermarkets here is performing savings and loan transactions. Depositors of six different savings and loan associations in a three-county area surrounding Tampa and St. Petersburg can take advantage of the new service at no cost.

The new service, called Modern Money, extends savings and loan services to convenient supermarket hours and locations by allowing depositors to cash checks and make deposits and withdrawals from their savings accounts. The transactions are electronically transmitted to the shared clearing and processing center for

processing against a customer control record or switching to the savings and loan data center for authorization. The transactions are implemented over 1,200 bit/sec asynchronous telephone lines and backed up with written copies.

To minimize the use of supermarket personnel, the terminals are entirely customer-operated and are located away from customer service counter and cashier areas of the store.

### Modern Money Cards

Security is maintained by plastic Modern Money cards containing magnetically encoded information about the depositor and secret identification

codes, which must be entered before the terminal will accept or verify a transaction. All cash transactions are handled by the supermarket service counter employees after verification by the terminal. In this way the terminals do not contain cash, but can process cash transactions.

The supermarket terminal transactions are identical in form to savings and loan transactions: withdrawals are immediately deducted from savings balances, deposits are credited subject to collection and checks are cashed against savings account balances until the checks clear.

On a daily basis the savings and loan association receives a statement of

each customer's account and a listing of all transactions. The supermarket merchant receives a reporting of every transaction (to use in balancing his cash accounting) and a weekly summary (to monitor store traffic patterns as they are affected by the terminals). The depositor receives statements from the savings and loan association listing all deposits and withdrawals, including those performed at supermarket terminals.

### Hardware Configuration

A Data General Nova 3 minicomputer with 80K-bytes of memory performs the file and communications processing for the network. The secret personal identification number, account status, Modern Money card expiration date, listing of the types and limits of allowable transactions and a running current seven-day total of allowable transactions are maintained on a 92M-byte disk.

File updating of this information is provided via an on-line CRT after telephone inputs are received from the savings and loan. Terminal transactions are processed by the Nova 3 computer on a time-sharing basis and electronically relayed over phone lines to the DP center that maintains the master files for each depositor.

Other peripherals used in the network include a Data General Dasher printer, 1,600 bit/in. tape subsystem, 300 line/min line printer and DCU/50 data channel interface. Software for the system was provided by Transaction Data Systems and the network design by Systems Technology, both Orlando-based companies.

After a second Nova 3 computer is installed for the network within a few months, communications processing and file processing will be separated. The network will then accommodate up to 500 terminals.

### Something for Everyone

To the Modern Money cardholder, the new service facilitates shopping, check cashing and savings and loan transactions. The supermarket retailer has increased store traffic, lower check cashing and credit card costs and less employee time required for these activities. The savings and loan institutions use the network to increase their service hours and locations at a cost that is shared by various financial institutions, since Modern Money is a statewide network.

The participating supermarkets are located in Pinellas, Hillsborough and Pasco counties surrounding Tampa and St. Petersburg. The six sponsoring savings and loan associations are Florida Federal Savings & Loan Association, Franklin Federal Savings & Loan Association and Guaranty Federal Savings & Loan Association, all of St. Petersburg; Freedom Federal Savings & Loan Association of Tampa; First Federal Savings & Loan Association of Tarpon.

Florida S&L Development Corp., an Orlando-based marketing and development firm, was formed to develop a cooperative funds transfer system for the savings and loan associations of Florida that could be shared with other financial institutions.

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Harris now delivers the most cost/performance effective multi-use computer system in the industry.

Our new family of high performance systems—S115, S125 and S135—together with our powerful VULCAN Virtual Memory Operating System supports more than 50 terminals. Simultaneously.

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COMMUNICATIONS AND INFORMATION HANDLING

# System for Agents Eases Phase-In to DP Net

(Continued from Page S/11)  
basic business operation.

Because all procedures are designed for use by insurance-trained personnel rather than DP specialists, training new operators is simplified and general understanding of the system is facilitated. "It makes it easier to use a system when even the salesman can understand how it works and what's going on," one user said.

Because flexibility is a paramount concern and utilization of the most technically advanced hardware enhances flexibility in this approach, the IAC maintains a continuing evaluation program for equipment selection. At present, DP systems installed within client facilities use the Data General Micronova processor with a 20K-word capacity, a Model 6012 CRT terminal, dual diskettes and a 60 char./sec printer for hard-copy output.

An optional Diablo printer is used in situations where users want the capability to prepare computer-generated letters and other documents that look like original-typed materials.

Where the user has a terminal installation, IAC is currently using the General Electric Terminate 30 with MTA II dual cassette tape. This 30 char./sec terminal provides capacity for auto-search and storage as well as interactive capability with the central DP facility in Houston.

## Future Developments

An orderly network of written documentation is now the norm for the insurance industry. There is no doubt that the communication medium must be changed to meet increasing needs. In order to do this, a number of basic agreements must be reached so that some degree of standardization may be achieved.

In the absence of such standardization, IAC has taken an approach which it feels provides optimum flexibility and facility utilization. By using off-line file accumulation, for example, a variety of media may be accommodated: In installations with local DP capability, data may be transferred via floppy disk or transmitted directly to the CPU by telephone line.

With terminal installations, data may be accumulated in cassettes in the terminal, then transmitted via phone line to the CPU through a multiplexer, which provides multiple access to mainframe storage without queueing delay.

In addition, IAC has completed a study and is now beginning exploratory work aimed at a real-time reformatting procedure. When completed, this switching network will allow agents to communi-

cate with insurance company computers without having to change programming to suit various formats.

A group of agents and insurance companies will participate in a trial program in which IAC will provide the "translation" through its computer facilities. This test with a prototype system will provide the basis for additional service capabilities to participating agents and will sup-

ply needed flexibility until industry standards are developed.

Such flexibility is essential

and no two independent agents necessarily work with the same groups of companies. Different formats,

data to be handled using modern DP technology, much less technologies now in development.

Inefficient communications have been the source of serious problems in other fields, and the insurance industry recognizes the need for positive action.

Thomas A. Harlan is vice-president of the Independent Agent Center, Inc., Houston, Texas.

for independent agents, since a given agent may deal with several insurance companies

program variations and other details can make it economically impractical for

## Cluster your entries so



*With 65,000 Daily Transactions*

## Clearinghouse Handles Volume Stock Trades

CHICAGO — Options Clearing Corp. (OCC) has combined the accuracy and convenience of local data gathering with the control normally associated with large, centralized computer facilities by implementing a high-speed data entry communications network.

OCC is, under Securities Exchange Commission regula-

tions, the sole clearinghouse for all exchange-listed stock options traded in the U.S. The daily volume averages over 65,000 complex financial transactions representing approximately 14.5 million shares of stock.

According to Jack L. Pecot, OCC's vice-president in charge of data processing, "by law, settlement for options

trades must take place the morning of the business day following the trade — unlike straight stock transactions, which allow for a five-day settlement period.

"In addition to our tight turnaround schedule, we've had to deal with steadily increasing volumes. When we opened our doors April 26, 1973, we processed an average

of 911 options contracts daily. On July 15, 1977, just over four years later, we processed an all-time high of 306,000 contracts.

"We anticipate a continuing pattern of growth, so a fast, reliable communications system that can handle large amounts of data is absolutely critical to us. We had to have the ability to compress data

and transmit it at high speeds off-line in order to save both transmission and processor time."

OCC's communication network, initiated 15 months ago, includes a total of eight Mohawk Data Sciences (MDS) System 2400 data entry and communication systems installed at headquarters here and at OCC branch offices. Of the eight systems, five are OCC's and three belong to associated organizations in the securities industry.

Two System 2400s are located in Chicago, two are in New York, two in Philadelphia and one each in San Francisco and Los Angeles. New York and Chicago are linked via dual 56 kbit/sec high-speed data lines. There are dual 9,600 bit/sec lines between Philadelphia and Chicago and single 9,600 bit/sec lines from Chicago to San Francisco and Los Angeles.

The 32K MDS system utilizes an IBM 2968 protocol emulator that allows tape-to-tape communications compatible with OCC's two central 370/148 mainframe computers.

OCC serves and is owned by the five stock exchanges involved in the trading of options — the American Stock Exchange, Chicago Board Options Exchange, Midwest Stock Exchange, Philadelphia Stock Exchange and the Pacific Stock Exchange. Options, if exercised, grant the holder the right to purchase or sell, depending on whether the option is a call or a put, a given number of shares of stock at a given price.

### Transactions 'Matched'

OCC is essentially a post-trade processor for options traded on the floors of the five exchanges. After trading hours, option-transaction data collected during the day on magnetic tape or punched cards is fed into each exchange's computer system for processing. These transactions must be "matched" daily; that is, "buy" orders must be balanced against "sell" orders. The matched trade data is then transmitted via the MDS off-line communications network to OCC's twin IBM 370/148 data center in Chicago.

Reports generated in Chicago are sent to the appropriate branch offices in print-image form on magnetic tape, which requires no further processing before they can be translated into hard copy. That means that OCC can use service bureaus with excess print capabilities in branch office cities to print out reports rather than invest

(Continued on Page S/24)

## everybody wins. Mainly you.

You run a wholesale business. Two locations, 3000 customers and growing. But rather than hire more order clerks, you put a computer in your main office. Trouble is, feeding it orders keeps your clerks queued up, your direct line tied up, and your computer idling while your slowest operator taps out 30 words a minute.

We have a solution: A system that features our newest Dataspeed® 40 terminals clustered on a common controller in each of your two locations. Information is entered on a simple keyboard, with your own display forms to guide the operator, then held until all corrections are made and your computer is ready to receive it. Saves time. Avoids billing and shipping errors. Helps reduce inventory. Improves your cash flow.

Solving problems in data communications is an all-out commitment of the Bell System. If you haven't talked systems with your local Bell Account Representative lately, you're missing something.

### The system is the solution.



Bell System



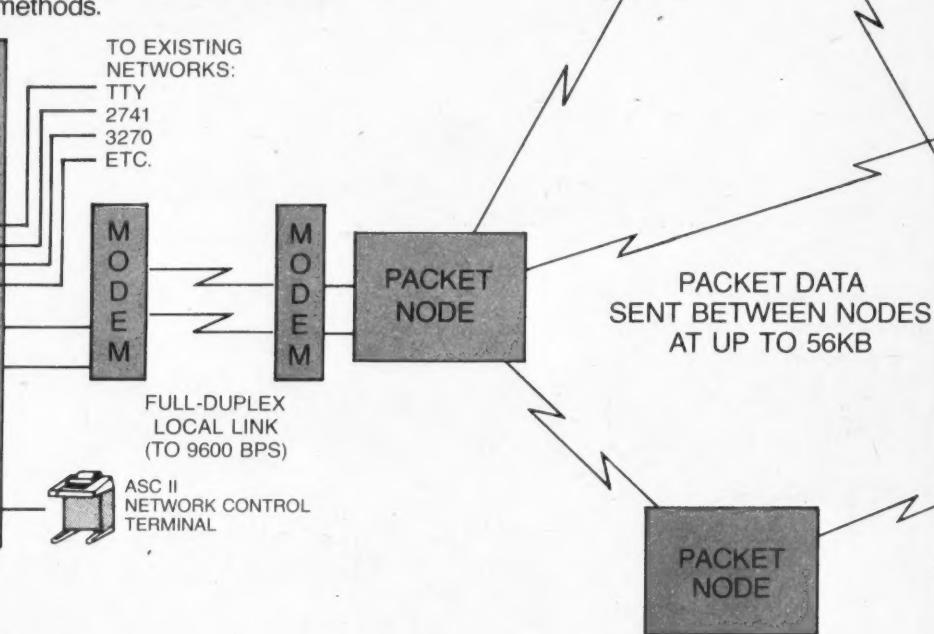
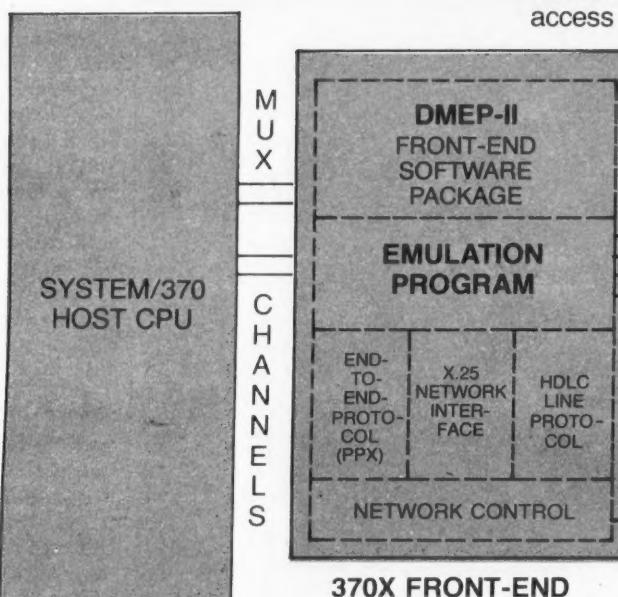
# 3270/3790 Users: There's no way you can build or expand Wrong! Here's how Raytheon lets you do

Put a PTS-100 controller, with up to 32 terminals, at each site at which you want to run 3270-type applications. Load it with Raypack software. Next, arrange a local leased line — up to 9600 bps — to the closest public packet network node. At your host System/370 CPU site, load the DMEP-II software package into your 3704 or 3705 front-end controller. Arrange a similar leased line to the node closest to your CPU. Your network is now ready to operate.

DMEP-II and Raypack take care of everything else. They provide the X.25 device interface and the Higher Data Link Control (HDLC) line protocol — the international stan-

dards used in public packet networks. Plus an operating system that enhances the Emulation Program in your front-end to allow it to perform under both bisynch and HDLC simultaneously. Thus, even when using public packet networks, your other communications networks remain operational.

The result: your existing network investment is preserved, your existing applications software remains unchanged, and you have added the capacity to extend your 3270-type network. And when you set up a public packet network, you get six capabilities no conventional 3270-type network can provide.



## 2. Cut Line Costs Significantly

Most 3270-type messages are easily convertible into "packet" messages used in packet networks. A single kilopacket — equal to about one million bits of data — costs less than a dollar to send from node to node, regardless of the distance between them. So your biggest line costs will be for local connections. And packet networks use efficient protocols, line-sharing techniques, automatic error correction, and no polling, so overall efficiency is improved too.

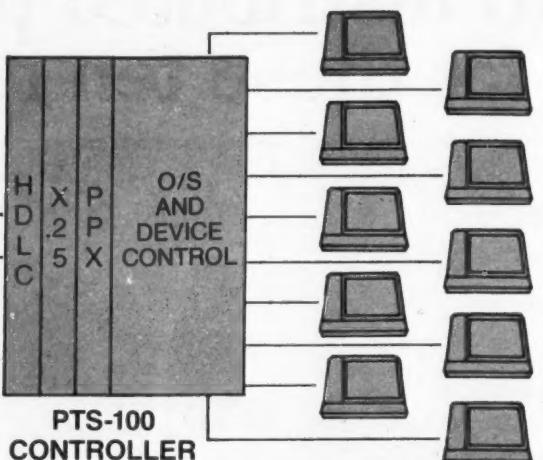
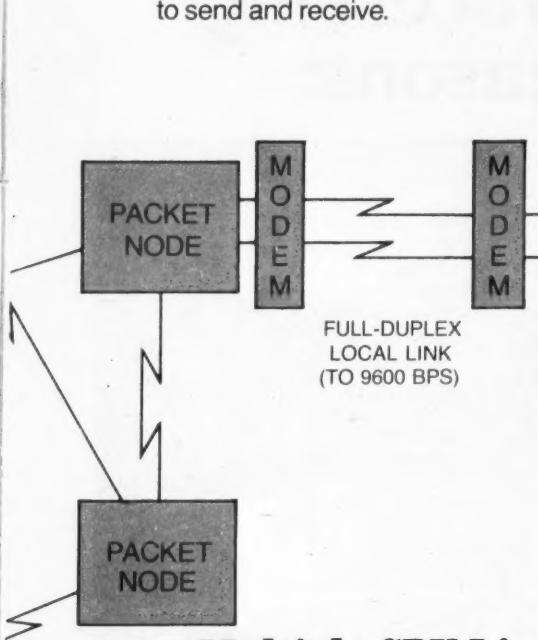
## 3. Cut Equipment Costs

Start with Raytheon PTS-100 terminal prices — up to 30% below IBM's. Add to those the savings in front-end controller hardware by reducing memory overhead, eliminating extra ports and avoiding the extremely costly and complex implementation of VTAM/NCP. Then consider the advantages of full-duplex operation, higher data rates, and better response times — all of which reduce hardware requirements too.

# an existing network in a hurry. Right? it:

## 4. Immediate Availability

DMEP-II and Raypack are available right now from Raytheon. The PTS-100 system is deliverable within 60 days. When you get those products, you load DMEP-II in the front-end using the same system used on your 370X. You load Raypack on the PTS-100 controller. Each loads in just minutes. You are ready to send and receive.



## 5. Multiple CPU Links Without ACF

If you have a number of CPU's supporting 3270-type functions, you don't have to wait for (or pay for) IBM Advanced Communication Function (ACF) to allow terminal-to-terminal, CPU-to-CPU or multiple domain functions. You get them built into Raytheon's public packet software as standard features.

## 6. Multiple Data Paths, Ultimate Uptime

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RAYTHEON

# Remote System Cuts Power Use 10% to 15%

(Continued from Page S/2)

stream occupies only a fraction of the 2,400 bit/sec channel capacity. At this speed, peak distortion, which is directly related to the error rate, is close to 6%. The likelihood of error is not significantly increased over conventional multiplexers or other low-speed techniques.

This application is significant in several ways. The underutilization of channel capacity is offset by equipment savings and simplicity of system design, as no multiplexers, line bridges or specialized modems are required to combine the synchronous and asynchronous data streams.

Another factor is the ease with which the system can be modified, upgraded or reconfigured by altering the number and speeds of the channels on the 96 Multi-Modes. This is important, because Wetterau plans to upgrade its 4,800 bit/sec terminals to 7,200 bit/sec sometime in the near future.

An additional advantage of the 96 Multi-Mode is its ability to operate over a degraded phone line. By flicking a rate switch on the front panel, the line speed can be reduced to either 7,200 or 4,800 bit/sec, allowing reduction of number of encoding levels. Usually this can be done without interrupting the normal operation of the two channels.

#### Power Management

The software of the IBM System 7 allows it to poll each distribution center power control terminal every minute. These terminals have plug-in accumulator cards that store the updated electric-meter reading in anticipation of polling.

If power consumption exceeds a set level, the System 7 sends the terminals a shed-load signal. This is accomplished via a wall-mounted relay box. Various appliances at the remote distribution centers are then shut down, such as air conditioners, heaters and battery chargers. No appliance is shut off more than once every 15 minutes, and average shutoff time is about five minutes.

Various fail-safe mechanisms are built into the system. Freezers, for example, have a built-in temperature override. If a freezer's temperature is above a given point then its refrigeration unit can bypass any attempt by the power control system to shut it off. This feature is especially useful on hot days and on days where frequent loading and unloading takes place. At other times, five-minute shutoffs have no effect on food preservation and provide energy savings.

There are additional safety features. If the System 7 fails to poll a given distribution center or if a center fails to acknowledge within a given three-minute period, an automatic bypass takes over that allows all equipment at the affected site to be turned on. Protection against terminal or switching-panel power failure is provided by a double relay system, which requires one relay to be in the "on" position while another is off. In the event power fails to these relays, all appliances can be turned on.

The central-site communications control center was built by Wetterau. It is designed to deal with just about any kind of line or equipment problem, though, to date, problems have

been minor. Monitoring, testing and patching capabilities in place keep tabs on all phone lines, modems and interfaces.

A VF patch panel aids in monitoring network functions in conjunction with several pieces of test equipment. An oscilloscope allows continuous monitoring to visually verify system and phone lines. Lines can be further checked for attenuation frequency response using a line transmission test set. Checking of error rates is facilitated by a modem test set.

Further simplifying fault isolation are the 96 Multi-Modes. They have built-in test features that allow them to perform local and remote line loops and to generate test signals.

Wetterau's energy management sys-

tem generally saves 10% to 15% on average energy consumption in the majority of our distribution centers. Savings are significant when one considers typical energy consumption/day figures for some of these locations range from 10,687 kW hours to 18,000 kW hours. It's hard to put a dollar value on these savings, since they fluctuate from day to day and are influenced by environmental factors such as temperature.

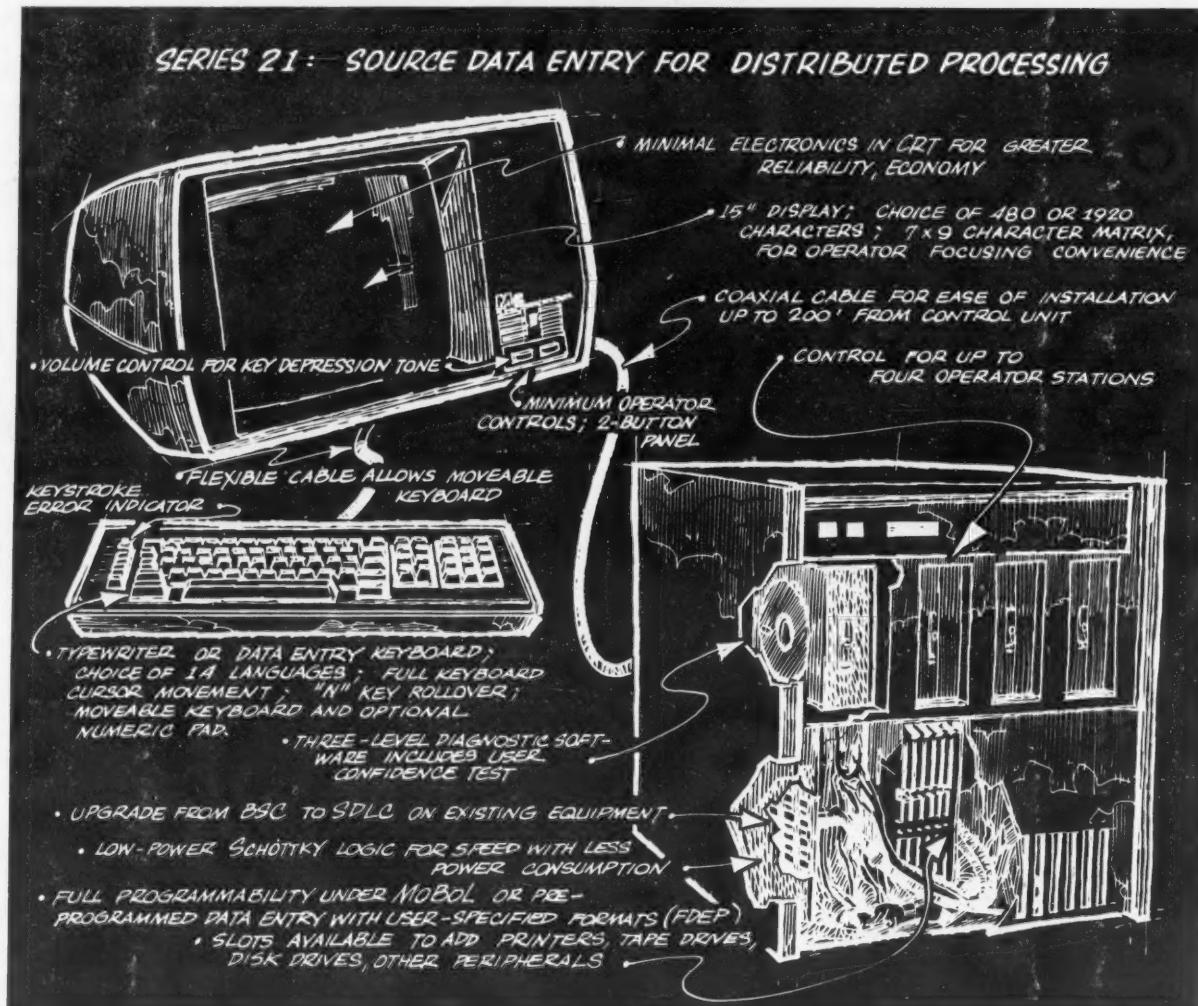
What types of energy waste does the energy management system correct? Usually the unseen ones. At one of the distribution centers the firm noticed a sharp jump in energy use at a certain time every day. When the problem was investigated, it was a worker turning on the battery chargers to give the bat-

teries a "boost." It was found that the batteries didn't need the charge at that time. Now the control system running 150 bit/sec asynchronous data over a 2,400 bit/sec synchronous channel turns the charger on at night, when the rates are cheaper. And it was found that turning the charger off for a few minutes during the charging cycle gave the batteries a better charge.

Future plans for the system include the attention of distribution center security routines to the power management system. These will allow central site personnel to monitor the system to spot unauthorized access to distribution centers after hours.

Hiatt is a programmer and technician at the DP center of Wetterau Inc., Florissant, Mo.

## MDS Series 21. Engineered to provide your best growth path into distributed processing for these ten reasons:



## SPC's Datadial Connects Insurance Firm Branches

A Dallas-based insurance holding company, Republic Financial Services, Inc., is linked to Southern Pacific Communications' (SPC) Datadial network.

Datadial, SPC's dial-up, computer-controlled, circuit-switched digital transmission system, allows Republic Financial's branches across the country to communicate with the parent firm's computer in Dallas.

Donald K. Eisan, Republic Financial vice-president in charge of DP services, said his company was not always connected to SPC's network.

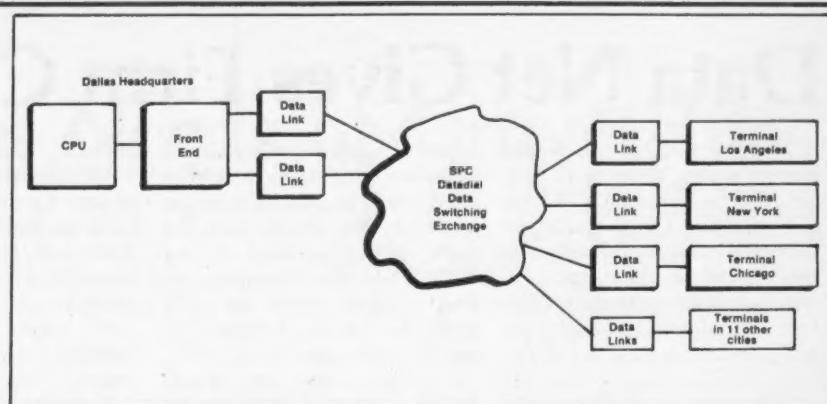
"We remained with Datran right up to their bankruptcy," said Eisan. "And then we were forced to hook up with

the Bell System. Datran's network was far superior to AT&T Lines."

That's the main reason Eisan switched to SPC. SPC had purchased Datran's assets in October 1976, brought the system back on-line and further refined it in early 1977.

Republic Financial uses SPC's network to allow branch terminals in 17 cities across the country to communicate with the mainframe in Dallas. Branch locations in such cities as Detroit, Atlanta and San Diego enter new insurance applications into their local Datapoint 1153 terminals.

This is not an on-line application, Eisan noted. Rather, the Dallas Datapoint 5500 computer calls each branch



Republic Financial Services Branch Office Network

terminal on a scheduled basis nightly and the terminal transmits insurance applications over Datadial at the present rate of 2,400 bit/sec. Computer connect time is less than one second and a typical call lasts about one to two minutes.

Each night in Dallas, the computer processes the applications. The computer then calls the appropriate branch terminal on SPC's network and transmits a completed insurance policy, which is then printed out on the 1153's. The next morning, the insurance policies are mailed out to Republic Financial customers.

"The Datadial system gives me digital reliability, usage-sensitive pricing and the flexibility to make network changes," Eisan said. "We have a program under way now to upgrade some remote sites to 4,800 bit/sec."

For example, as the network expands and remotes are added, there is no need to reconfigure a multipoint/multidrop network. Each new branch installs another Datalink, the on-site equipment through which the user interfaces with the Datadial network. These same Datalinks can be added to the host computer to provide more ports.

Datadial has some advantages over DDD and Wats, Eisan pointed out. The older DDD network facilities are primarily designed for voice transmission and usually take 11 to 17 seconds to connect to the desired party. Datadial is geared to pure data transmission with a 0.8 second connect time and can operate at 9,600 bit/sec.

"Republic Financial was anxious to get back on Datadial's service. We do receive both improved transmission rate and quality of service," Eisan added.

The Series 21™ family of distributed processing systems from Mohawk Data Sciences installs easily to replace keypunches, key-tapes, key-disk systems and remote batch terminals, and expands just as easily to provide more power and flexibility in performance than any of those devices, for these ten reasons:

**1. Low Cost.** Series 21 prices begin at less than \$115 per operator station per month.\* That's as much as 50 percent below some competing systems.

**2. Reliability.** We've tested Series 21 for more than 30,000 hours, or the equivalent of ten years of use. That includes an entire week of "burn-in" for every integrated circuit we use—at extended temperature. We engineered Series 21 to work the way you need it to perform.

**3. Two-level Software.** With Series 21, you can begin source data entry without programming, or with it. Choose the Formatted Data Entry Program (FDEP) for productivity within hours after installation, or choose full programmability under MOBOL™ (Mohawk's Business-Oriented Language) for more sophisticated editing, file handling or local processing.



**4. Ease of Installation.** Series 21 systems can be installed practically anywhere, within minutes. The processor, memory and peripheral and communications control boards are all contained within a unit smaller than many office copiers. Operator stations are as portable as electric typewriters.

**5. Expandability.** As your distributed processing requirements grow, you can plug in additional operator stations, add printers or tape drives, or link Series 21 directly to large clustered data entry/communications systems from MDS™.

**6. Storage Hierarchy.** Series 21 handles from one to four diskette storage devices compatible with Basic Data Exchange (BDE) formats. Disks and tape drives can be added to System 21/40 to provide greater capacity.

**7. Flexible Communications.** Series 21 users can implement remote batch communications under binary synchronous or SDLC protocol, and can expand from BSC to SDLC with existing equipment.

**8. Large Display Screen.** A 15-inch CRT display is standard on all Series 21 systems, and you can choose 480 or 1920 character screen displays. Characters are displayed in 7x9 dot matrix in green on green phosphor behind a non-glare screen.

**9. Operator-Oriented Keyboards.** Data entry or typewriter keyboard layouts are available, and more than a dozen programmable function keys are standard on all Series 21 operator

stations. Each station features full CRT cursor control via the operator keyboard. Other keyboard features include "N" key rollover, moveable keyboard and optional numeric pad.

**10. Worldwide Maintenance Support.** Mohawk Data Sciences has one of the largest sales and service organizations in the computer industry, with more than 2,500 employees in over 300 offices, worldwide.

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**Mohawk Data Sciences**

## Data Net Gives Firm Central Financial Control

DALLAS — Do you know the old saying about not being able to have your cake and eat it too? OKC Corp. found an exception to that rule when it established a data terminal network linking its operations in four states to its headquarters here, according to Jim Fajack.

"We were at a dilemma," the OKC vice-president-finance recalled. "Corporate management needed current information for making timely financial decisions. At the same time, we believed it was important for our field sales personnel to be in control of data entry and invoicing. This gave them a way to be sensitive and responsive to customer needs. They were also in a better position for spotting invoicing errors."

OKC, with nearly \$170 million in annual sales, has crude oil purchasing and refining, cement plants and dredging operations in Texas, Louisiana, Oklahoma and Florida.

Four NCR 7200 data terminals were installed at sales offices and two others at the corporate office. The terminals are used to enter bills of lading and other sales data. The information is collected on cassette for transmission by leased telephone lines to an NCR Criterion 8550 system at corporate headquarters.

Data for printing invoices is returned to the field offices via the same terminal-phone link-up. NCR 64-40 matrix printers in the field offices are used for generating hard copies.

"Before we adopted this system in 1976, it wasn't unusual for some locations to be one to 1-1/2 weeks behind in processing invoices," according to DP manager Charles Galloway. "That hurt cash flow. Statements often weren't completed until the 15th of the following month. Credit managers didn't have access to up-to-date status and accounts receivable agings. In fact, a credit manager might not know the status of an individual account until 20 days after the books were closed," he said.

Now, invoices always are mailed the same day the billing information is received, he continued. The quickest turnaround time has been about seven minutes.

### Sales Trends Spotted

More complete and timely sales information has been a major boost to sales and production managers, Fajack added.

"We can see sales trends as they are being established and adjust refinery production activities throughout the month," the vice-president said.

"In our cement group, sales managers now have daily sales

reports. Before, individual salesmen might have had a hip-pocket notion of sales on a day-to-day basis, but the sales managers were in the dark. Now the managers can keep a close watch on sales netbacks and follow up quickly with salesmen."

Cement sales are made F.O.B.-customer location, so transportation charges must be backed out of bills to obtain an accurate sales and profit

picture, Fajack explained. OKC adapted NCR's ARC accounts receivable software.

"If we had tried to develop a system of this magnitude from scratch, it would have taken months of programming effort, and, even then, it wouldn't have been as elaborate," Galloway said.

Automation of accounts receivable has helped improve credit operations. A credit manager can ask for an aged

analysis of accounts at any time. Past due statements, as well as invoices, go out on time, and payments are prompt. Billing errors have been reduced, too, he noted.

"We are able to obtain an aged trial balance of accounts receivable within two to three working days of month-end closings," Fajack said.

OKC was able to cost-justify purchasing the NCR Criterion computer and data terminal

network on the basis of one application — oil lease royalty accounting. Previously this large DP job was handled by a computer service company and costs were climbing.

"Our ability to automate the other accounting functions, which were entirely manual before, has all been cost-justified by hard dollar savings in oil lease royalty accounting," Galloway said.

(Continued on Page S/24)

# Sycor announces that's shame! (Except for

We're proud to introduce an on-line system that offers as much as the big guy's system. For a lot less.

It's the new Sycor 290—a 3270-compatible display system that can save you up to 25% over a three-and-a-half-year lease. And even more when you purchase.

An outgrowth of our long experience with on-line systems, the Sycor 290 is available in remote and local configurations—that support up to 16 CRTs and printers in any combination. And in a remote mini-cluster unit that supports a combination of up to eight CRTs and printers.

Remote configurations use either Binary Synchronous (BSC) or Synchronous Data Link Control (SDLC) line protocol at speeds from 1200 to 9600 bps. This fast transmission time allows you to better control your line costs and to configure your network for optimum performance.

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### Special diagnostics mean fast service.

Service for the Sycor 290 can be sped up by using our sophisticated diagnostic programs. You can run them to pinpoint problems quickly and easily. And alert the Sycor field engineer to the problem when you call for service.

## Links Software, Data Bases

# National Network Serves Needs of Universities

By James C. Emery

Special to CW

A national computing network has been established to serve the needs of colleges and universities. Called Edunet, the network links computers at participating institutions and permits faculty, students and administrators to share the variety of computer software and data bases that

exists at computer centers within educational institutions.

The computer has become an important factor in higher education. An increasing number of students receive some form of computer assisted instruction and use the computer in their daily assignments. Faculty members need the computer to support their

research as well as adding richness to their instructional material.

Librarians look to the computer to aid them in day-to-day operations and, increasingly, in retrieving information from bibliographic data bases. Administrators depend on the computer to perform a variety of DP and management functions. In-

deed, colleges and universities could scarcely exist in their present form without the computer.

All of this has come at a significant cost. Although the fantastic advances in microelectronics have sharply reduced the hardware costs of computing, personnel costs have continued to escalate and are now the dominant cost

component. This also stimulated a growing interest in the sharing of computing resources within higher education as a way of partially containing increasing costs.

No institution — not even the strongest and most financially secure — can afford to provide the wide range of computing services desired by its members solely from its own internal resources. The choice must be either a serious restriction on the variety of services that can be provided internally or, alternatively, the purchase of services from outside the institution.

This is not a new notion. State and regional computing networks supporting higher education have been around for a number of years, and they continue to play an exceedingly useful role. Arpanet pioneered in serving an important segment of the research community. Commercial firms are increasingly providing valuable specialized services such as bibliographic search and retrieval. The continued growth in this traffic testifies to the value of networks in meeting the needs of education and research.

### Something for Everyone

Edunet does, however, provide a new capability. By serving the national higher educational community, Edunet makes it possible for any student, faculty member, researcher or administrator to gain access to the best computing resources available anywhere in the country. Edunet is not restricted to a limited subset of the community, but rather is designed to serve the computing needs of everyone who could benefit from access to specialized resources.

Edunet was developed by Educom, a Princeton, N.J.-based nonprofit organization founded in 1964 to promote resource sharing in higher education. The new network grew out of a series of three invited seminars sponsored by the National Science Foundation in the winter of 1972-73 to explore the possibility of establishing a national computing network for colleges and universities.

Over 150 leading educators and computer scientists who participated in the discussions concluded that a national network was desirable enough that its feasibility should be explored in more detail.

As a result, the Planning Council on Computing in Education and Research was organized as an activity of Educom in the summer of 1974. The council now consists of 22 major universities, (Continued on Page S/25)

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# Clearinghouse Handles Stock Transactions

(Continued from Page S/17) in its own additional equipment and staff. For example, OCC sends print-image tapes of reports required by New York-based member firms to Securities Industries Automation Corp. (Siac), a service bureau that handles processing for the New York and American Stock Exchanges.

New York is OCC's largest volume branch office with roughly 325,000 records transmitted to and from daily. Two of the eight System 2400s in OCC's communications network are located at Siac to further streamline the flow of data between New York and Chicago. Siac receives Amex trades from member firms, runs its trade matching system and transmits the resulting matched trade tape to OCC via the 56 kbit/sec data link for clearinghouse processing.

Utilizing a data compression feature of the MDS software, OCC is able to reduce the number of bits transmitted in

any given batch by at least 30%. The compression takes place automatically during transmission.

## Daily Traffic

"We transmit roughly 550,000-plus records daily among our five locations," Pecot said. "Each record averages 144 output bytes. Matched tapes from the exchanges are transmitted to us daily by 9 p.m. and we

guarantee processed reports by 8 a.m. the next day. In that kind of time-critical, high-volume environment, we had to have the ability to compress data, generate print-image tapes and communicate at the 56 kbit/sec rate. MDS was the only vendor with an 'off-the-shelf' compression package capable of handling high-speed 56 kbit/sec lines. Those features were the major reasons we selected MDS over

other vendors of data communications equipment," he said.

"MDS was the only vendor who could really offer us the entire tape-to-tape communication system we needed," he added. Others could have supported the 56 kbit/sec speed, but would have required on-line transmission and resulted in unacceptable software overhead on the mainframe."

OCC is currently considering adding data entry terminals to its existing System 2400s for use during regular business hours. "We are beginning to look at ways to utilize the equipment's capacity to handle data entry and communications concurrently," Pecot said, "now that we've solved the problem of how to keep up with our growing communications volume."

## Net Provides CPU Control Of Accounts

(Continued from Page S/22)

"Royalty income on a single lease may have to be divided among 500 interest owners. Legal requirements on record-keeping and payments are stringent. We issue between 3,500 and 4,000 interest checks each month, as well as generating reports for federal and state tax purposes.

### Automation Underway

OKC's five-person DP department has automated accounts receivable, invoicing and plant payrolls during its first year. Now the staff is launching a total data base system with B-3 multiprogramming capabilities. By year-end 1978, OKC expects to have all general accounting functions on the computer.

While management is happy with the faster cash flow, Fa-jack said more important improvements are just over the horizon.

### Pipeline Terminus

OKC is the southern-most terminus for a common carrier pipeline that distributes refined oil products to customers throughout the Midwest. When OKC's products are sold up the line, several days may pass between the sale date and OKC's receipt of the bill of lading information. That means invoices often aren't mailed until three to seven days after a sale. And the value of a single invoice can exceed \$1 million, he explained.

To begin with, we're twice as good. With multiple processors. It's as simple as this. On-line means on-demand, and one processor won't do. Because any processor, even one of ours, can fail. And if that failure occurs during a peak period of transactions, you're out of business while it's down. And out of luck if you miss your re-start point or clobber your data base. And out of control if you lose or duplicate the transactions in process when the failure occurs.

### You need a NonStop™ System.

Tandem has built the world's first multiple processor system, designed from scratch in both hardware and software, to provide non-stop processing—even during a failure—with no penalties in the speed, capacity, throughput or memory utilization of the system.

And it can grow without penalty. Starting with a basic two processor system, users can add processors, memory or terminals incrementally all the way to a fully expanded system of sixteen processors supporting 2048 data communications lines, with individual files of up to four billion bytes fully supported by a comprehensive data base management system. But the best part is that you never have to reprogram. Ever. Your Tandem NonStop System just gets bigger and better. At remarkably low cost.

### Why the big ones fail.

The big mainframes are expensive to begin with. And even they can fail. Which can leave you high and dry in the on-line environment. But there are other difficulties with the big numbers, too. Of prime consideration in the on-line world, they offer very limited throughput for their price. And by the time you've hung a lot of communications lines on them, they suffer a derating which makes their performance even less attractive.

And whereas you may eventually need that kind of horsepower in your

on-line system, chances are it's an expensive overkill at the outset. What you need is a system which will do the job efficiently on the way in, and grow as your needs grow, in modest price increments. It makes the big systems people wish they were more flexible.

### One mini just won't make it.

Minis have made a name for themselves, justifiably. But in the world of on-line, where needs keep growing, the one mini system just can't cut it. With the architectural limitations inherent to a single mini system, growth can build system overhead so fast you'll grind to a halt before you know it.

### And strap-ups will kill you.

The answer might seem to be to strap two processors together. One goes down, and the other takes over. Right? Wrong. It's not that simple. System software for a single processor system won't run on the strap-ups. And the fate of any transactions-in-process at the time of a failure is unknown. As is the state of any records being updated. And growth beyond the original system capacity is well nigh impossible.

What you really need is the one multiple processor system designed for multiple processor operation. Tandem's NonStop System.

### The four major "on-line" considerations.

When anyone is considering an on-line system, regardless of size, there are four primary points to consider. Throughput. Availability. Data Integrity. Transaction Protection. The system must be able to handle the job. It must be there when you need it. You must be sure of the integrity of your data base. And you must be sure you don't lose or duplicate a transaction. Even during a failure. No single processor system anywhere can provide that assurance. It takes a multiple processor system designed for the on-line environment, and Tandem is it.

### For better throughput, spread the files.

We built the Tandem NonStop System with geographic independence of programs and files. They're handled automatically under Enscribe, our Data Base Record Manager. And instead of having one processor with one bottleneck channel and a

*The Tandem 16 NonStop System is composed of multiple, independent processors with dual redundant communications paths. The unique interaction between Tandem hardware and software assures not only continuous operation, and the integrity of your data base, but also throughput unmatched by any other computing system of comparable cost.*



## Ten Participating Institutions

# Edunet Links Data Bases at Different Colleges

(Continued from Page S/23) both public and private, in all parts of the country.

With significant financial support from its members, supplemented by aid from the Carnegie Corp., the Exxon Education Foundation and the Ford Foundation, the council set out to plan for and implement a national network.

The resulting network con-

sists of three major components. First, there are the autonomous computer centers at universities that are willing to sell services to remote users at educational institutions and nonprofit research organizations.

Each center establishes the list of services it wishes to support and sets the prices it wishes to charge. Edunet cur-

rently has 10 such computer center suppliers — at Dartmouth College, MIT, Yale University, State University of New York at Albany, the Triangle Universities Computer Center in North Carolina, the Universities of Minnesota and Wisconsin, Rice University, Stanford University and the University of California. Together they of-

fer a wide source of unique programs and specialized data bases on a variety of hardware.

### Second Component

The second component of the network is the communication link that connects the remote user to one of the supplying computer centers. It was decided at an early stage

to rely on a commercial common carrier for these communication services rather than using dedicated leased lines.

This strategy not only avoids the tremendous fixed costs of maintaining leased lines, but it also makes it possible to reach a much more broadly dispersed group of users and suppliers than would ever be possible with dedicated lines. After a review of the alternatives, Edunet decided to use Telenet as its principal communication vendor.

The third component of the network is the "facilitating" service that makes resource sharing possible. In order for users to access a remote computer, they must find out which computer center offers a desired service, how the service can be used, whom they can call for assistance, how they can become authorized to use the computer and how they can pay for the services they receive.

### Variety of Services

The network offers a variety of facilitating services to aid such users. It maintains an on-line directory, located at the Stanford University computer center, which contains information about services available and the means of accessing them. It publishes a newsletter which describes network activities and services. It maintains a "hot line" with a toll-free number — 800-257-9505 — through which a prospective user at a university can obtain person-to-person assistance in locating desired services or dealing with a network problem.

Since Edunet was established only recently, its traffic is still quite limited. Even when mature, the network is likely to serve only a relatively small fraction of the computing needs of the higher educational community; the bulk of these needs will still be served locally by a campus computer or even a personal microcomputer.

However, in many cases, the specialized programs or data bases available could not otherwise be provided at a reasonable cost. Some institutions may even be willing to rely on the network for all of their computing, but most will probably choose to supply the majority of their own services and look to the network only to obtain specialized services.

A number of institutions may also want to sell services to other network users, and thereby earn revenues that can offset their own purchases of computing services.

Emory is president of Educom.

# processor system anywhere an "on line" environment.

fixed priority system, Tandem's NonStop System distributes the work and the files across multiple processors, multiple discs, and multiple channels. Enscribe controls the pattern and the flow for maximum efficiency. Because of simultaneous disc accesses, there's a dramatic improvement in response time. It's one of the performance benefits about a multiple processor system which you can't get on a single processor system.

### Ease of programming, by design.

Historically, multiple processor systems have been a bear to program. Not with Tandem. Guardian, Tandem's operating system, lets you write your programs as usual. You can add more processors, or memory, or terminals as you need them. No need to rewrite programs. Ever.

And we make it easy to write the programs in the first place, with COBOL or with TAL, a powerful language designed for fast, flexible programming. The software development tools of this mini-based system rival those of far more expensive systems, and include NonStop operation, data communications, mirror volume capability, full file protection, screen formatting programs, and a host of housekeeping utilities.

### When you're thinking "on-line," think in Tandem.

Which means think in multiples. Few, if any, "on-line" systems can be installed and forgotten. The number of transactions, the number of terminals on-line, or the number of applications programs to be run on the system keep growing. Most likely, all three will multiply.

Which is traumatic unless you've started with the one system on the market which can grow with you—even if the growth occurs during the initial configuration phase—without having to start all over again.

### NonStop growth and NonStop protection, too.

Because the Tandem System was designed for NonStop operation in both hardware and software, it offers an extraordinary measure of protection against a failure in any processor, I/O channel, disc drive, or in the software. No other system offers this measure of assurance.

When a failure does occur in any segment of the system, its back-up counterpart completes the task, without a hitch. Since all programs are geographically independent, and the operating system both distributes and monitors all work-in-process, recovery from a failure is instantaneous. There is no restart; no backing up to a hopefully safe point.

The system monitors its own operations, performing all tasks in a distributed fashion across the multiple processors. Even when a CPU goes down, another CPU is immediately aware of the failure and picks up the task in process and completes it. No data and no transaction need ever be lost or duplicated. The integrity of the data base can be fully protected. It is truly unusual, but it's one reason why we say no single processor system anywhere can touch us in the "on-line" environment.

### NonStop software.

#### Guardian: Operating System.

NonStop operation.

Automatic re-entrant, recursive and shareable code.

Virtual memory system.

Geographic independence of programs and peripherals.

#### Enscribe: Data Base Record Manager.

Provides relative, entry-sequenced and key-sequenced files.

Each file may be up to four BILLION bytes.

Up to 255 alternate keys per file.

Optional mirror copy by disc volume.

#### Envoy: Data Communications Manager.

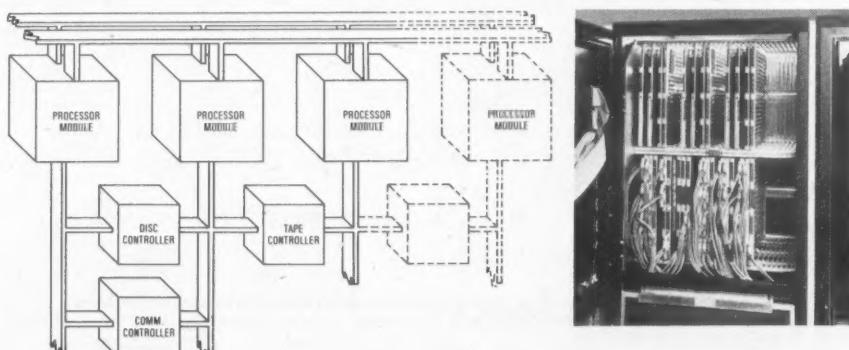
#### Languages: COBOL, TAL.

## TANDEM

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in California.

Photo and schematic show three processor modules with space for fourth module, interconnected to disc controllers, tape controllers and communications controllers.



# Shared Insurance Net Feasible, Cost-Effective

(Continued from Page S/3)

Seven basic studies went into the formulation of an optimized system. They were:

- Single company agent-field office communication alternatives (interactive agent office, batch agent office, nonautomated agent office).
- Integrated system, that is insurance companies sharing a network vs. individual company networks.
- Effect of level of agent participation on integrated system cost.
- Effect of level of company participation on integrated system cost.
- Effect of total transaction level on integrated system cost.
- Effect of terminal compatibility on integrated system cost.
- Backbone network alternatives for

an integrated system.

Several interesting general observations emerged from these studies. For one, the cost of any total system, single company or integrated, appears to be dominated by the agent (terminal and communications) costs. In turn, the terminal cost is usually larger than the communications cost. This is particularly true for an integrated system. Most of the local access cost is incurred on connections from the concentrators or multiplexers. The cost for connections from the terminals to concentrators or multiplexers to backbone switches is a small portion of the total local access cost.

The optimum design is a packet switch backbone network involving 14 switching centers and all 10,000

agents. The overall network structure is shown in Figure 1. The computer plotted network, shown as Figure 2, is completely compatible with both present and anticipated traffic volume requirements. It has the advantages of using shared lines for local access and using a highly reliable and flexible backbone network in order to achieve economies of scale for long-distance communication.

## Other Options

Other options are possible. For example, it is feasible to use a central switch controlling all traffic on a nationwide basis. However, there is an immense risk in terms of reliability for such a system and a large initial cost for construction of the central switch, even

though it carries a minimal amount of traffic.

Circuit switching is also possible, but is rather high in cost and response time for interactive traffic. It is possible to use a value-added network such as Telenet and we did indeed evaluate this alternative. Networks without any switching are also possible. However, these entail a great sacrifice in terms of flexibility and adaptability to traffic variations.

Using the network shown in Figure 2 and analyzing the resulting costs for seven different configurations, as shown in Table 1, the total cost for transmitting 1,000 characters through the various network alternatives varies from 6 cents to 16.8 cents. Studying these figures, which were derived from NAC's data base containing tariff rates for the entire country, we were able to establish the following conclusions:

## Cost Conclusions

- With all 10,000 agents in the data base included in the system, the total communication cost for the separate company networks is approximately four times that of the integrated system; that is, \$6.5 million/mo as opposed to \$1.66 million/mo.
- This cost ratio varies by only 15% for up to a 50% change in the unit transmission costs and in the unit hardware costs. This implies that the cost savings in the integrated system is achieved mainly from economies of scale and better resource utilization through sharing of facilities. It is relatively independent of the particular cost structure employed.
- Computer terminal incompatibility has only a marginal effect on the total integrated system cost.
- With the top five insurance companies excluded from the integrated system, the communications cost per unit of traffic increases approximately 40%. Thus, the participation of the "giants" in the integration effort is important, but not an absolute necessity.

## Telenet Higher

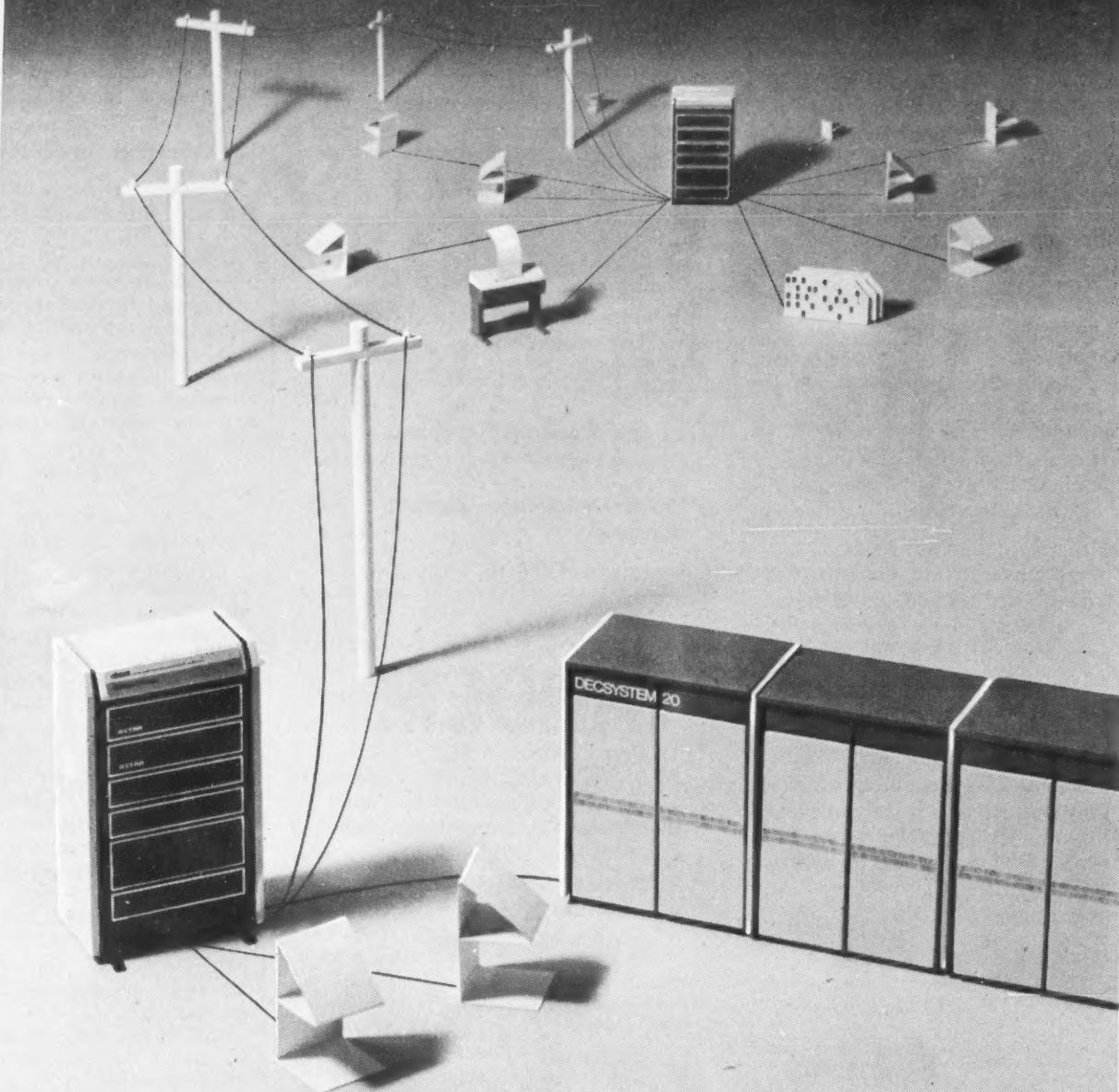
• The total communication cost of using Telenet as the backbone network is approximately 35% higher than that of implementing a private packet switched backbone network.

• The communications cost for an agent was found to be approximately \$113/mo, with less than 10% variation for a range of 2,500 to 10,000 agents participating. This cost was derived by first defining the communications cost for an integrated system that does not include agents to be the communications cost for the companies. Then, the agents' cost was estimated from a system that also includes the agents.

Our study is quite clear in indicating that, over a broad range of requirements, user population and tariff structures, an integrated network promises to yield major benefits for agencies and companies at significantly reduced communications costs. Such a network could be readily implemented with proven technology bringing both financial and organizational benefits to both the insurance companies and their associated independent agents.

Frisch is senior vice-president and Hsieh is a member of the technical staff at Network Analysis Corp., Glen Cove, N.Y.

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## Improve Data Gathering

# Multiplexers Reduce Credit Net Hookup Costs

Special to CW

The intelligent selection of data communications products can help local credit bureaus dramatically reduce their leased-line telephone costs while saving time through immediate, computerized reporting. One credit bureau executive stated he estimates 20% to 25% of end users nationwide currently have automated credit reports (with the rest using written and verbal reports), but he would like to see the automated share rise to between 50% and 65%.

Spurring automated credit reporting are the trends toward more rapid and frequent transportation (consumer "mobility"), the growth of major credit-granting retail firms and the increase in the exchange of data between credit bureaus.

An example of the latter was the agreement last summer to link up the computerized credit networks of Chicago's Trans Union Systems Corp. (TU) and Dallas-based Chilton Corp. in a message system called "Credinet," which, when fully operational this fall, will connect credit bureaus serving about 40% of U.S. consumers. Rounding out the "Big Five" credit networks are Pinger in Houston, TRW in Anaheim, Calif., and Credit Bureaus, Inc. (CBI) in Atlanta.

This piece will discuss some of the problems inherent in a data communications network, describe the architecture of one of the "Big Five" systems, and finally, explain how frequency division multiplexers (FDMs) produced a dramatic reduction in leased phone costs for the Merchants Association of Bakersfield (Calif.).

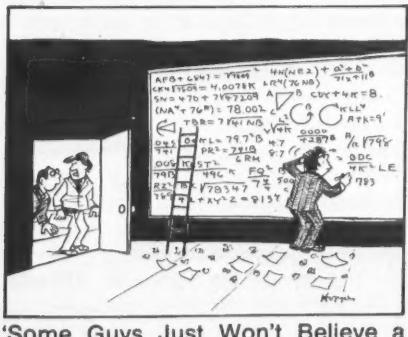
Because data communications is the most visible part of the total data structure, it's always blamed when something goes wrong. It's the umbilical cord to a computer. You can break it by bringing the computer to you — or you can strengthen it and reduce the cost of that link by adding modems, multiplexers or line drivers.

### End-User Neglect

Another data communications problem is that of end-user neglect. Granted, the huge nationwide credit networks have design expertise and state-of-the-art equipment and they know all the tricks for getting cost breaks on leased telephone lines. However, what they don't do — and should — is pass on these cost-effective-techniques to end-users.

It is distressing that the end user is often neglected this way. Often, when end users want to interface to these networks, there's no one there to show them how to do it cost effectively.

TU's network is based in Chicago.



The firm has a tremendous data base that serves 64 cities, stores credit information on 54 million households and supports more than 1,000 points of access to the host computers — two IBM 370/158s. Supporting the mainframes are an OS-MV operating system; IBM 3350 disk storage system and CICS communications software.

The average household data base for TU's system consists of seven "pages" of information, with each page containing 240 8-bit bytes of data. The mammoth system, which generates about 12,000 credit reports per hour (one billable transaction equals seven pages), recently set a record when it processed 87,000 transactions in one

16-hour day.

Radiating from TU's Chicago base are various "nodes" — actually minicomputer-based relay stations — located throughout the country, such as the one in Visalia, Calif., center for the Credit Bureaus of Tulare County.

### Visalia Node

The Visalia node, using Raytheon Data Systems Co.'s "PTS" minicomputer, can handle about 24 data channels in the 300 bit/sec range, plus a cluster of CRTs (up to 16) running at 48 bit/sec and a 300 line/min printer. The Raytheon "PTS" mini emulates IBM's 2848/2260 system and has buffers for 20 teletypewriters.

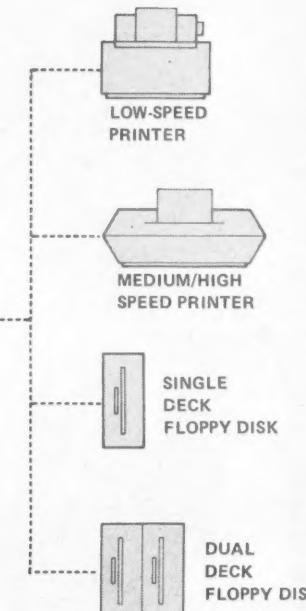
This node allows the Tulare County system to fully automate every aspect of credit reporting — verification, collection, employment data and ratings. But, what about the users, those who rely on these bureaus for credit information — the large retail stores, the small specialty shops, the catalog stores? How do they get the data they need?

Often, they have to rely on written reports from a bureau, which involve a costly and very slow process. One of the alternatives is to have dial-up modems located at the node that can be accessed remotely from various retail outlets requesting credit data.

(Continued on Page S/38)

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# Intelligent TDMs Enhance Network Utilization

(Continued from Page S/4)

The network traffic statistics must be monitored very closely when statistical multiplexing is used. If traffic activity forces a channel to wait for "space" on the high-speed aggregate data stream for a period longer than the buffer length assigned to the channel, then subsequent data is lost. This potential blocking characteristic is reduced either by extending channel buffer lengths, increasing the high-speed aggregate data rate or by reducing the number of circuits that have access to the statistical multiplexer.

#### Data Compaction

Data compaction multiplexers gain their efficiency through the statistics of language usage. This technique can

be very efficient for a very specific language usage application, since the more frequent characters are assigned few signaling elements and the infrequent use characters are assigned the code words, where the number of signaling elements is roughly in inverse proportion to their frequency of use.

The very characteristic which makes a code set very efficient for a specific language application can make it very inefficient for another application. For instance, a code set intended for English language text transmission can be very inefficient for transmission of numerical data (as is the case with Morse code).

In order to maintain a high level of efficiency, the terminal code set (such

as Ascii) is abbreviated when converted to the data compaction code set for transmission. The efficiency is therefore obtained at the sacrifice of data transparency.

The data compaction characters define, in their bit sequence, their own termination. This is necessary in order to determine if a sequence of say 10 bits represents one 10-bit character from one channel, two five-bit characters from two different channels or perhaps two three-bit characters and one four-bit character from three different channels.

As such, a bit error in one data compaction character destroys the identity of its termination, and this loss of character synchronization is permeated through succeeding characters

of other channels. Eventually, a true character ending is recognized and character synchronization is restored.

This error multiplying characteristic dictates that data compaction multiplexers operate with a highly sophisticated error protection scheme. Indeed, to operate without error protection is to invite disaster.

The data compaction channels will, when the code is properly matched to the language usage, utilize a proportion of the high-speed aggregate data stream which is on the average less than the overall circuit data rate, which is, of course, the objective of data compaction. The instantaneous proportion will vary above and below this average depending on the specific character transmitted. The minimum bandwidth is utilized when there is no data on the channel and only the terminator for that channel is transmitted.

By the same token, data compaction will, like statistical multiplexing, exhibit variable propagation delays during periods of high network activity. It is also susceptible to blockage if the data activity of its channels exceeds the capability of its buffers to bridge the transmission delays encountered.

With the intelligent TDMs, the communications manager has three multiplexing techniques available to him, all of which offer significantly higher levels of network utilization than is possible with hard-wired TDMs. It is therefore incumbent upon him to look deeper into the operating characteristics and traffic patterns of his data communications services. He can then weigh the advantages and disadvantages of the multiplexing techniques.

John M. O'Neil is product line manager at General DataComm Industries, Wilton, Conn. 06897.

## CCITT Codifies Multiplex Plans

(Continued from Page S/8)

media to the central site, where all the channels are demultiplexed, thereby significantly reducing line costs.

Figure 2 illustrates the use of such a TDM element in a combined data/telex network. Telex subscribers at site 2 can communicate through the Telex switch with other Telex subscribers or with the four Telex computer ports available.

The three 1,200 bits/sec terminals at site 1 are demultiplexed at the central site after utilizing the bypass feature at site 2. They are fed directly into the computer, as are two 1,200 bits/sec terminals at site 2 and all the terminals at site 3. The TDMs in effect remote the ports of the Telex switch and the central computer, while saving transmission costs by multiplexing data streams.

The appearance of TDM network elements of this type have had a strong influence on the efforts of the CCITT to establish new standards and protocols for data/Telex transmission. With these new emerging protocols it is likely that data/Telex networks of the near future will have additional capabilities, including interaction with the packet carriers [CW, Oct. 24].

Popovici is manager of networks design at Timeplex, Inc., Hackensack, N.J.

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## Terminal-Based System

# Small Town Monitors Utilities Consumption

ASHLAND, Neb. — Halfway between Omaha and Lincoln, a small midwestern town is making quiet history. Ashland, Neb., is the successful proving ground for the first phase of the exciting commercial technology of load management. Gas, electricity and water are monitored automatically by a terminal-based management system.

The system, designed by Darco, Inc., makes use of existing public equipment, in some cases totally eliminating new design and manufacturing costs. The terminals used are the Texas Instruments Silent 700 Model 743 KSR units, which serve as operator interfaces for evaluation of errors, system tampering and utilities close-outs.

Before the Ashland project, meter readers were still cheaper to use than automatic systems. Now meters are outfitted with tiny encoders that are substituted for the last rotating dial on the visual display.

As the encoder turns, magnetic impulses are generated and relayed to a hand-sized transponder. Each utility site monitors the many hundreds of consumers throughout town by silently calling their transponders via existing telephone lines.

In turn, the transponders transmit data back to Darco's 2K-byte central controller, which automatically records a customer identity code, meter readings and possible system tampering. If the line is busy during a reading, the controller makes a note of the number and automatically redials at a later time. Even though the subscriber phone lines are used as a system

medium, in no way does the system controller interface with normal customer use.

The use of existing phone lines eliminates the need for costly new wiring or radio equipment. Meter modification and system hook-up costs are split three ways by the City of Ashland, Omaha Public Power District and People's Natural Gas, the serving companies. Reading costs, billing time and errors are reduced, and hourly monitoring through the terminals establishes user patterns that are charted to estimate peak load periods of consumption.

A single controller and interfacing 743 terminal can handle many

thousands of transponders, Darco said. This feature makes the system well-suited to large-scale use. Further costs are cut when the system is used to determine time of day readings for peak loads, since traditional dual register meters are not required.

### Direct Control

Direct control over utilities would allow the serving companies to immediately shut down and bill departing customers and to activate gas, water and electricity for incoming tenants. During peak load periods, energy users may be charged premium rates, whereas users who defer their needs until minimum periods may be re-

warded with lower rates.

Darco's vice-president, Frank L. Ashford, pointed out system benefits that are particularly attractive to cities: Consumers are secure from criminals posing as meter readers, and utilities thefts are minimized since possible system tampering is automatically logged by the controller.

The constant turnover of tenants in high-rise structures can be monitored by the individual utilities companies when consumption stops, and occupancy by new tenants is indicated by reactivation of their utilities. In addition, user trends may be graphed to efficiently plan city energy development programs.

## DDP Adaptable To Central Nets

(Continued from Page S/6)

ges. These applications have different priority and timeliness requirements which cannot be handled by the traditional teleprocessing system.

Using QTH, the administrative message is entered off-line during normal working hours without using resources needed by high priority applications. The message is then transmitted during periods of low line or host usage. Thus, QTH achieves full utilization of terminal operators during working hours, balances the load on the network and host and provides timely allocation of resources to ensure appropriate application priorities.

LFS and QTH blend easily into existing teleprocessing systems whether the problem is to upgrade the capacity and the efficiency of an existing system or to add new network applications. In contrast with other concepts which may require a considerable investment to rebuild the basic system, LFS and QTH preserve and enhance the smoothly running systems already in place.

Implementing LFS and QTH with flexible and programmable terminal systems forms an ideal base from which to implement additional distributed processing functions as such functions are shown to be cost-effective and operationally beneficial.

Alcorn is a system engineer at Harris Corp., Data Communications Division, Nashua, N.H.

# RJE Terminals Save Firestone Annual \$100,000

AKRON, Ohio — To give its smaller offices the same computing power as its larger offices, Firestone Tire and Rubber Co. turned to remote job entry (RJE) terminals — and it's saving \$100,000 per year.

Five years ago, however, divisions of Firestone had a different story to tell — in fact, 24 different stories. Because each office had its own unique requirements, each determined its own DP solution.

Hence a smaller office chose to have no automated equipment while the larger facility opted for its own in-house computer.

"It was a very costly operation," according to Paul Kuntz, section manager for RJE processing. "At the same time that we were building a large-scale computer facility at headquarters, our offices were trying to update and enlarge their own facilities. It was sim-

ply a duplication of effort."

Besides the money that Firestone thought it could and did save by centralizing its operation, it also gave small divisions the same DP capabilities as large divisions.

So the company began to invest in RJE equipment, utilizing keypunch and key verify equipment designed to give the individual offices the power they needed, when they needed it, to perform their lo-

cal DP tasks.

The equipment succeeded, but at a cost and not only a dollars and cents cost, either. There was also the cost of using one piece of equipment to perform only one function and, in the case of the 50 or so keypunches, being limited in editing capabilities.

"We wanted not only a key-to-disk facility," Kuntz explained, "but one that supported card equipment." The

company also wanted a range of compatible equipment that would not overpower small divisions or shortchange large divisions. And it wanted it all from a single source, he said.

In September 1975, Firestone began installing its first Data 100 units. Twelve months later, the 24 systems representing 75 key entry visual display stations were installed in Firestone's remote locations. The assortment of multifunction terminal systems replaced competitive equipment including keypunches and assorted card equipment.

## Better Editing

Cost savings is not the only benefit to Firestone, Kuntz noted. "Key-to-disk is a much better environment than keypunch," he said, "because we have significantly better editing capabilities."

Kuntz said he was also pleased with Data 100's Hasp 360 software, which supports a CRT console. "Not only does it allow us to condense the data so that transmission time is cut," he noted, "but since we can interleave data streams, we can transmit and receive print data simultaneously."

The new Firestone network ties all of the nearly 75 terminal operators at the 24 remote sites directly into the company's IBM 370/158 operating under MVS. That way, a division with three subsidiaries can draw the operating information it needs from its subsidiaries.

"At that point, when the CPU has totally edited the data," Kuntz said, "we know it is correct. It may cost us a little more to go through the central site," he conceded, "but the autonomy it buys the remote offices more than makes up for the difference."

The equipment was selected carefully — picking the power that matched the office's individual needs:

- One division now uses a Model 77 key-diskette system with a low-speed 125 line/min printer to generate 3,000 lines of print a month.

- Another division uses a Model 78 communicating Keybatch system with four CRTs and a 300 line/min printer to print 2 million lines of reports each month.

- Other divisions use a dual processor Model 78 Keybatch system with five CRTs and a 1,000 line/min printer to generate and print more than 8 million lines a month.

In all, Firestone has line printers ranging in speeds from 125 line/min to 1,000 line/min, a variety of magnetic tape drives, punches and readers and a range of transmission speeds from 2,400 bit/sec to 9,600 bit/sec.



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## Thrift Institutions Collaborate

# Point-of-Sale EFT Attracts Users, Cuts Costs

Special to CW

Electronic funds transfer systems (EFTS) seem to be going over well in the Buffalo, N.Y., area. Three competing EFTS point-of-sale networks are in operation in the metropolitan area, which has a population of about 1.7 million.

The latest of the three networks is Instacard, which is the trademark for a debit card system jointly owned by The Western New York Savings Bank and Niagara Permanent Savings and Loan Association. Between them, the two thrift institutions hold assets of \$1.2 billion — a smaller total than institutions in either of the two competitive systems — but both saw growth in only the first three months of the system's operation.

Both institutions offer deposits and withdrawals from statement savings and regular checking accounts through retail terminals installed in Tops Friendly Markets stores, and the food store company uses the network to speed up its own in-store check-cashing services. Tops was selected as the retailer for one basic reason: More checks are cashed or cleared through Tops stores than through any single bank in the Buffalo area.

Kenneth W. Kerber, senior vice-president of Western New York Savings, and James D. Chase, senior executive vice-president of Niagara Permanent Savings and Loan, established objectives for the system during its design.

"We had three objectives," they said. "First was a hope to build new depositor relationships to bring in new deposit dollars. Second, we were looking to displace some of the costs of the traditional banking environment by putting some of the transactions into the stores. And third, because of the competition posed by the other two networks, we wanted to avoid losing our customer base to somebody else who's entered EFTS."

In the first nine months, the depositor relationship goal became evident. Kerber said that Western New York Savings can pinpoint approximately 9,000 new accounts with total balances in excess of \$5 million as the result of the EFTS promotion. Chase reported comparable figures for Niagara Permanent.

### Activity Building

Activity on the network started slowly but is gradually building, and by the end of 1977 — about a year after starting — it is estimated that the break-even point of 40,000 transactions a month will be reached. The nature of those transactions, however, is interesting to note. Deposits outnumber withdrawals by two to one; however, in terms of dollars, deposits are about five times as great as withdrawals.

This means that the network not only brought in new depositors, but also the activity is heavily in favor of new deposit dollars. "There has not been a single day when the dollar of deposits has not exceeded the dollar of withdrawals," Kerber noted, "including bank holidays."

From a different vantage, the statistics indicate that the number of transactions is about equally divided be-

tween statement savings and checking accounts. The dollar volume is lopsided in favor of checking accounts,

tributed to a couple of factors. One is that the competitive systems conditioned Buffalonians to the idea of

*In the first nine months, the institutions met their goal of attracting new depositors. Western New York Savings can pinpoint approximately 9,000 new accounts with total balances in excess of \$5 million as a result of the EFTS promotion. Comparable figures were reported for Niagara Permanent Savings and Loan Association.*

however. About 40% of the dollar activity is in the statement savings area, and about 60% is in checking accounts.

These encouraging figures are at-

banking at their supermarkets. The other is a spin-off of the blizzards of 1977 that inundated the city. "It made people realize they had banking

facilities available nearby in a supermarket at a time when it would have been very difficult for them to get to a bank branch," Kerber recalled.

The card base has also been growing slowly but steadily, according to Leonard H. Knabekamp, president of InstaCard Corp., which is the corporate entity established by the institutions to manage and promote the EFTS system. The project started with a zero card base, offering a separate card for each institution and a third card for the Tops organization to use as a check-cashing identification. There were about 40,000 retail check identification cards and some 9,000 cards out for the

*(Continued on Page S/37)*

# DECISION DATA'S CS 780 TERMINAL

## OFF-LINE OR ON-LINE, IT KEEPS ON WORKING.

There's a brand-new entry in the remote-entry field: the first on-line batch/remote job entry terminal that doubles as an off-line 80 or 96 column card data preparation station.

The Decision Data CS 780. An excellent on-line terminal. An excellent off-line work station. Not a compromise between the two.

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DECISION DATA<sup>TM</sup>  
COMPUTER CORPORATION  
makes computing cost less

# Public Packet Nets Expanding Overseas Service

(Continued from Page S/7)

At that point in time, in order to give international users access to computers on Telenet as well as those on Tymnet, Tymnet, Inc. provided a connection to Telenet from the international record carrier (IRC) nodes in the U.S. These connections took the form of asynchronous channels between the intelligent Tymsts and time-division multiplexers (TACs) that provide access to Telenet. The Telenet Mux looks like another host to Tymnet, but in effect provides terminal access to any of Telenet's customers' computers.

Next, RCA Global Communications, Inc. and Radio Suisse came to an agreement to install a Tymst in Berne, Switzerland. It provides access to U.S.

hosts with toll-free dialing from all cities in Switzerland. Most recently, similar agreements and Tymst installations have been completed in Brussels, Belgium; Amsterdam, The Netherlands; and Frankfurt, Germany — with ITT, WUI and RCA respectively. The Spanish PTT has installed a Computer Transmission Corp. (Tran) multiplexer node that interconnects to WUI's Tymst in New York.

Italcable ordered a Tymst for installation in Rome as of mid-September. It will connect to all of the aforementioned IRCs, plus TRT Telecommunications, which is in the process of filing with the FCC for permission to interconnect with a circuit between Italcable and its Tymst in one of its U.S. gateway cities.

Looking to the future, network users may expect beneficial changes and continued expansion internationally. New cities will be added as the IRCs finalize agreements with more foreign administrations. Hopefully, these new locations will include Japan, Sweden, Norway, Australia, The Philippines, Iran, Brazil and others.

Networks will appear and some equipment will change. TransCanada Telephone System now has the Datapac network in the early stages of operation. Public U.S. networks will ultimately connect to Datapac using X.25 protocol.

This will mean data service will be available from 54 Canadian locations. Both the UK and France will also have national networks and plan to change

their Tymsts for gateway nodes that were in the overall plan long before the interconnection to the IRCs and Tymst.

The value-added networks have proposed to interconnect to these gateway nodes using X.25 protocol, now under development.

Presently, all traffic flow is between international terminals and domestic computers. Foreign hosts will be connected either to Tymnet nodes or data networks in other countries for access by U.S. terminals.

Finally, more features will be added to the service. They include dedicated channels, dial-up facilities in all locations and higher speeds. Although the present tariffs do not encourage a higher character transfer rate, the equipment installed can easily accommodate 1,200 char./sec asynchronous and 200-4,800 bit/sec synchronous terminals.

*Robert B. Field is vice-president for product marketing at Tymnet, Inc., 10261 Bubb Road, Cupertino, Calif. 95014.*

## System Lowers Insurance Costs

(Continued from Page S/10)

claims information on a specific policy can be called up and displayed on a screen for inspection within a few seconds' time, Riggs said.

Another advantage of the dispersed processing network for the client is the compression in time between the entry of data to the network and the generation of finished reports.

"Previously, the postal service handled most transfers of data," Riggs said. "This often resulted in a long delay, sometimes weeks, before reports could be prepared and delivered to the client. With our dispersed processing network, data is delivered to Amarillo on an on-line basis, thus providing for a much faster production of complete reports. We can now work a very tight schedule; if necessary, reports can be produced for clients on an overnight basis."

### Full-Time Circuit

Communications between the client office and the computer center in Amarillo is typically achieved over leased telephone lines. "The volume of raw data handled by many of our clients is enough to require the use of a telephone circuit full time," Riggs reported. For users with a lesser volume of traffic, Wats service or even standard direct dial service may suffice.

When data has been completely processed, reports are generated and transmitted back to client offices over the same telephone facilities. Special printer units associated with the workstations are then used to convert the processed data into hard-copy management reports that can be used by financial executives representing client companies.

Currently, about 30% of the total volume of data transmitted to Corporate Systems is accomplished with the aid of the Datashare systems. The company receives most of its other data through the mails or a teletypewriter service.

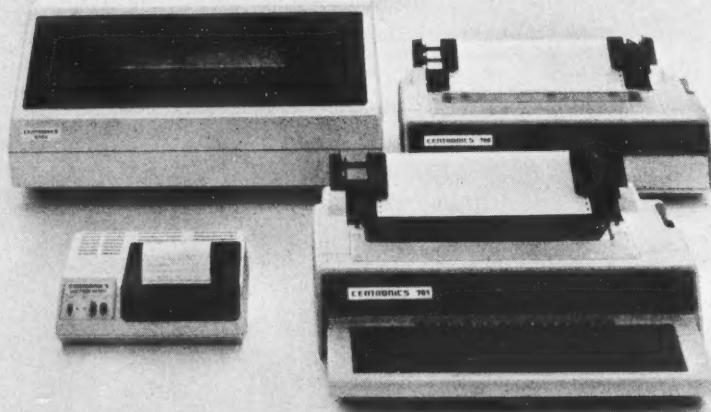
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## Union Carbide Net Serves Firm Worldwide

Special to CW

Union Carbide Corp. has achieved operating benefits, thanks to a companywide data communications network.

Since first installing remote batch systems in 1970, Union Carbide has added to its network. Today there are over 100 Data 100 systems located in its sales offices, warehouses and manufacturing plants around the U.S., Canada and Puerto Rico, with new overseas installations now on-line.

Systems run the gamut from remote-batch terminals to card and tape-oriented systems, to key-to-disk data entry systems. This network feeds two large computer centers where administrative, financial, order entry and scientific data is processed: one in Tarrytown, N.Y., containing two IBM 370/168s; the other in South Charleston, W. Va., containing two 168s and a 370/165.

The impetus that led Union Carbide to first consider Data 100 equipment over seven years ago came from a need for more effective and economical remote-batch processing. "Union Carbide is a very cost-conscious company," Ed Bird, manager of data and support services, said. "Price/performance is the name of the game."

The company decided upon Data 100 after measuring its remote batch terminals against IBM 360/20 computers and various IBM batch systems, the Univac 1004, and other vendors' equipment. "Data 100 gave good service, the quality of its printing was better than that of the other vendors and equipment reliability was generally higher," Bird said.

The price/performance criterion has applied ever since as more sophisticated systems have been added, providing concurrent data entry and batch transmission. Today the remote sites using key-to-disk systems possess virtually all the data entry and editing capability that would be available in a large data center mainframe.

### Improved Throughput

"Taking the systems as a whole," Bird continued, "we're averaging about 20% improvement in data entry throughput compared with the old card equipment. Our remote locations today submit a total of about 86,000 batches per month to the two data centers and print about 300 million lines per month."

One of the most advanced systems in the Union Carbide network is located at the Films Packaging Division in Chicago. This plant, which manufactures casings for a number of food products such as sausages, turkeys and hot dogs, has been an industry leader in the application of key-to-disk systems to business problems.

The first systems were installed in 1974, replacing IBM 129 card equipment for production jobs such as inventory, payroll and accounting.

According to Dick Pearson, systems analyst, "With the 129s, we were having difficulty getting clean source data from the user departments. With the Keybatch units, we were able to put in a large number of edits based on knowing exactly what should be on each individual source document. The user departments now know exactly

what is required of them, and the system edits out any mistakes before the batch goes to the host computer. We've cut down our reruns tremendously."

### Keybatch Software

Under Keybatch software, data entry operations proceed under control of an input format which defines data validation checks, field editing and arithmetic/logical operations. The operator has a number of modes available to check the accuracy of data during and after the entry operation, perform an audit of records in the system and automatically update a batch after records have been changed, add-

ed, or deleted.

After the systems had proved themselves in the production environment, the division began looking into other possible applications — specifically, order billing and order writing, two of the most vital operations in the company.

The division had been using Friden Flexowriters and Burroughs Corp. billing machines for order writing and billing. "We were getting a 40% to 45% error rate because the system was so highly manual," Pearson said. "Consequently, we were working overtime two or three nights a week."

Working with Data 100 personnel, the division developed a billing system

that took advantage of the Keybatch system's editing capabilities and disk storage. Especially vital to the application was the Index Sequential Table Retrieval (ISTRA) software, which enables a number of items to be stored and retrieved without operator intervention when batch data records are being created.

### Aesop Implemented

This was followed by implementation of Aesop — Automated Entry System Order Processing. Orders come into Chicago from sales offices and warehouses around the country and abroad, detailing the products that (Continued on Page S/36)

### CLIP AND RETURN FOR FAST RESPONSE

#### frequency division multiplexers

\$465 basic unit

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Series 200

Data rates: Mixture of asynchronous channels up to 300 baud.  
Channels: Maximum of 18 channels.  
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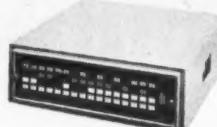
\$465 cabinet

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for data communication

# TNS Aimed at Users With Short Inquiry Needs

(Continued from Page S/13)  
or DDS interface unit.

Terminals enter messages to TNS via the polled or dial-up interfaces. Messages received by the network are checked for transmission and format errors, speed-converted and switched to the addressed customer. In addition, the network will determine if access to an addressed host is restricted and, if so, will block the message accordingly.

The network inspects incoming messages for correct format and excessive length (over 128 customer text characters) and performs a Longitudinal Redundancy Check (LRC). Character parity is checked in the polled terminal and host computer lines in addition to character count for the dial-up terminals using the Touch-Tone character set.

If Bell dial-up terminals (or comparable non-Bell terminals) are being used, a four-bit parity check is also made.

Error recovery is accomplished through retransmission. Diagnostic routines are initiated if retransmission is unable to bring about recovery, although the quantity of retransmissions necessary to trigger the diagnostic routines has not been specified.

If Bell terminals are being used, the dial-up Transaction I will not retransmit at all, while the dial-up Transaction II and the polled Transaction III will send three transmissions and then advise the operator of the need for manual intervention.

Bell's design goal is one undetected error for every 10 million messages (or

more). This criterion applies to the polled network with any terminal and to the dial-up network with Bell terminals or non-Bell terminals employing similar protocol. In the case of the dial-up network being accessed with a standard Touch-Tone telephone, the goal is one undetected character error for every 10,000 characters (or more).

No message is assumed to be delivered until the protocol of each element in the system is satisfied. Any message accepted by the network that cannot be delivered will be returned to the originator with an indication of the reason. Terminals utilizing voice response will receive a spoken explanation.

Two dial-up terminals are available from Bell at the customer's option:

Transaction I and Transaction II. Differing only in features, their basic operation is similar.

They both include a built-in Trim-Line telephone as well as slots for insertion of a dialing card and a customer card. The slot for the customer card is designed to enable the Transaction telephone to accept input data from a card containing a magnetic stripe formatted according to the American Banking Association's track-two standard.

In addition to the features just described, the Transaction II telephone also includes an eight-character visual display. The "Erase" button is used in a step-by-step call-up of groups of characters from the buffer. The buffer size is 63 characters on the earlier version and 128 characters on the Transaction IIA.

## Polled Option

Bell will provide, at the customer's option, a polled terminal called Transaction III. From the operator's viewpoint, the Transaction III is identical to the basic Transaction Telephone *except* that a telephone handset is not included and therefore, tone and voice answer-back are not possible.

There is also a difference in response time: with a polled terminal such as Transaction III, an operator can reasonably expect a response within 5 to 7 seconds of the inquiry, while with dial-up terminals the response would be significantly slower and less predictable.

From a system designer's viewpoint, the Transaction II should be considered from volume and/or security aspects. (A host computer can prevent "foreign" polled terminals from access, but if it authorizes access by one dial-up terminal, it must authorize access by all dial-up terminals.) The Transaction III operates, of course, at 1,200 bit/sec (half-duplex).

## Pricing Structure

The Transaction I telephone rents for \$22/mo to \$24/mo, the Transaction II for \$32- to \$36/mo and the Transaction III for \$35- to \$37/mo. Installation charges are extra. Dial-up access to TNS is charged according to existing tariffed telephone charges.

Other charges vary depending on area, but the Minneapolis, Minn., metropolitan area can be considered typical: Polled access to the network costs a flat \$14/mo. The host computer connection to the network costs a flat \$650-, \$700- or \$850/mo for speeds of 2,400-, 4,800- or 9,600 bit/sec. The cost of a modem or DDS interface unit as the host computer site is not included.

There are also usage charges: A base price of \$11/mo includes 200 "Transmission Message Units" (TMUs), where a TMU is based on a combination of transactions and characters per transaction. Additional TMUs cost 2 cents each. Based on typical applications (500 to 1,000 transactions per month), additional TMUs would constitute one-third to one-half of the costs of the TNS (which, again, does not include terminals or host site modems or DDS interface units).

Dick is communications project editor at Auerbach Publishers Inc. and this article is taken from Auerbach Data Communications Reports.

## Introducing Basic/Four distributed data processing.

### Right system, right price!

The right system should make each remote location an independent data processing center. That's what Basic/Four® computers do. And at the right price. Because there's a model to meet the exact needs of each location.

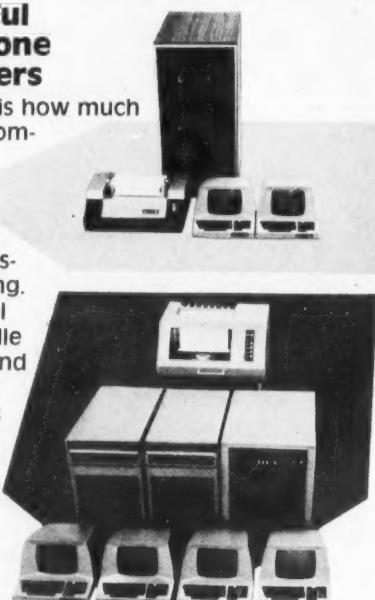
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After 6 years experience, with some 4000 installations, we can put in Basic/Four systems fast.

#### We talk to IBM all the time

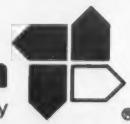
Our tie-in capability means your network of powerful, self-sufficient satellite systems can communicate with each other, and with most large, host computers. That adds up to the ideal distributed data processing system.

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Basic/Four Systems are also marketed in more than 30 foreign countries.

# Reliability Vastly Increased Modern Nets Save More Than Time, Money

Special to CW

Few technologies in recent years have grown as rapidly in reliability and cost-effectiveness as have communications networks — especially in the realm of remote computing services.

While advances in high-speed, digital data transmission, monitoring techniques and systems configuration have required more sophisticated equipment, users have seen marked increases in network reliability, error detection and capacities for handling large volumes of data.

Just 10 years ago, remote computing companies were used only for applications that required small amounts of input and output. Today, some of the largest DP users have become aware of the economy and capabilities of remote batch and time-sharing computer services. The large-capacity communications network has been recognized as the only way to effectively and efficiently distribute state-of-the-art computing power to the largest number of users over diverse geographic areas.

The network concept is a cost-effective one. By "sharing" a single data center, or a complex of data centers, both operational costs and, subsequently, billings to the user may be held at a minimum.

Utilizing more than 1,250 local dial-up ports, United Computing Systems, Inc.'s communications network, Uninet, for example, currently serves customers in more than 140 cities across the U.S. and Canada, with European access effected through the Tymnet network.

By January 1978, however, Uninet will itself extend to Europe, allowing both remote batch and time-sharing users to communicate directly with data centers in the U.S., without the need for auxiliary, interactive networks.

## Customer Concerns

Hardware is still the core of the computer services business, but spirited industry competition for a larger share of a growing market has placed increased emphasis on dependability and customer service. Technological innovations have contributed to this trend.

Some companies have invested substantial staff hours and capital in the development of more efficient methods for large-scale data transmission and systems configuration. The resultant benefits have been passed on to the user in the form of increased com-

puting capabilities at reduced costs.

Data transmission techniques have become highly sophisticated over the last several years. As recently as 1972, a line speed of 4,800 bit/sec was standard throughout the industry. Today, 9,600 bit/sec is the most common speed for analog service. In the early 1970s, a terminal capable of transmitting 30 char./sec was considered high-speed. Today, the 30 char./sec terminal is in major use and 120 char./sec is rapidly evolving as a standard.

Computer utilities are becoming better equipped to transmit large amounts of data. AT&T's Digital Data Service (DDS), already available in some locations, permits a line of speed of 56

kbit/sec and eliminates the need for converting digital information to an analog format for transmission over telephone lines.

Because DDS is expressly designed and equipped for passing digital signals, interface with the telephone network is simplified and reliability is enhanced, while the likelihood for error is greatly reduced. This, in addition to the increased capacity for handling larger jobs more quickly, will further strengthen the remote batch segment of the computer services industry in coming years.

Combined with large-capacity Modcomp II data concentrators, this DDS offering has enabled United Comput-

ing to begin integration of both timesharing and remote batch networks into a single operational system. A common front-end system, with the same operating software, will evenly distribute the entire transmission load. This will result not only in reduced communications costs, but in improved service reliability as well.

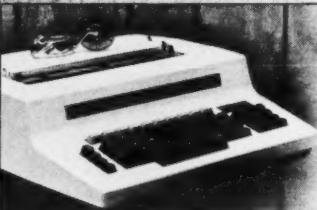
As more DDS installations become operational, more users may be supplied with higher quality remote computing capabilities at moderate rates.

These and other technical innovations are contributing to the ever increasing status of network communications.

# AGILE IS HERE

## First Agile A1 Sighting Reported

### Rejoicing throngs fill streets



Excitement swept the populace recently as word of the first sighting of the Agile A1 daisy-wheel terminal was flashed throughout the metropolis. The A1, reported to be the first in a long line of microprocessor-based terminals to be offered by Agile, arrived from the firm's large new manufacturing facilities in Sunnyvale, California. A large production run for inventory was said to account for the immediate delivery of the terminal.

Early dispatches reported that every A1 terminal undergoes long burn-in at high temperature to assure purchasers of reliability. Inspection of the unit by your trustworthy reporter (which was hampered by the capering multitudes) disclosed that the A1 features a Selectric-style keyboard with illuminated function lights.

Rumors that the huzzahs of the citizenry caused a horse to bolt on Third Street were found not to be

## Correspondent reports

### 26 Agile Service Centers Announced

A network of 26 service centers has been established throughout the Nation to provide care for Agile and GenCom terminals, according to late reports. All centers stock parts for both kinds of terminals, including the GenCom 300A, 300D, and 300Q machines. Centers in the major metropolises are staffed by Agile personnel, while the outlying Territories are served by carefully selected independent companies that are experienced in dealing with the Natives.

In an interview with Mr. R. Bullene, who identified himself as Agile's national service director, your correspondent elicited the following: "It's one thing to have an agreement for national service. It's quite another to have the necessary support in place. We're ready to provide service almost anywhere in the country."

Mr. Bullene solicited direct inquiries via the new electric telephone system at (408) 735-9904.

## Exclusive!

### Agile Optional Features Revealed

This chronicle has obtained a compendium of the optional features available with the Agile A1 terminal:

- ❖ Justification mode, which allows the terminal to produce perfect justified text. Variations in the 1/120-inch inter-word and inter-character spacing result in output of nearly photo-composition quality.
- ❖ A transparency feature allows the printing of all 128 ASCII characters to make debugging and error locating easy.
- ❖ Data compression allows the user to drive a 55-cps mechanism with a 300-baud line.
- ❖ The print enhancement option features automatic overstrike and underscore to produce bold, enhanced printing at high speeds.
- ❖ Hardware options include special keyboard configurations, 45- and 55-cps mechanisms, and custom microcode features.

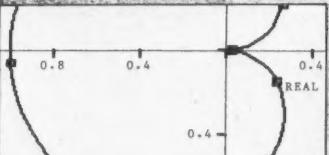
Details of Agile's options are too voluminous for this brief treatise, but may be had through contact with the manufacturer.

## Immediate Delivery!!!

### Agile promises shipment on receipt of order.

(Story on page 2, col. 4)

## Fiendishly Clever Plot Revealed



A conspiracy to speed data plot for science and business has brought to light with the use of the Agile Plot Support. More to follow.

You've spurred my interest.

Kindly supply full particulars on the Agile A1 forthwith by post.  
 Call me. I want to see if my electric telephone is working.

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# Union Carbide Net Links Offices Worldwide

(Continued from Page S/33)

must be manufactured to customer specifications.

"By using the edit, we're able to produce a production 'set' that fits customer requirements and our own ability to make the product," Pearson said.

"Once we output the production set it goes down to our production or finishing departments, and there's no turning back. If we make a mistake — say a typographical error that results in a casing 22 inches long instead of 28 inches — the division loses money. With Aesop, we've cut dollar losses significantly because the orders won't be produced unless they conform to specifications," he added.

Once the two systems were up and running, the error rate dropped to 5%. "Our throughput at the data center has increased by 35%," Pearson said, "but the most important thing is that the data is clean when it arrives at the host computer, saving a lot of reruns and computer expense. And we manage it with keypunch-trained operators. Another good feature of Keybatch in a 'sweat shop' environment like ours is that the user is not limited to the number of different programs that can run. We run between 350 and 400 programs here."

#### Hardware Setup

Current hardware at the Films Packaging Division consists of two Keybatch data entry terminal processors, each with 10M bytes of disk storage, four local and four remote CRT keystations.

The systems share a 300 line/min printer and a 9-rack tape. Remote job entry to the host computer in Tarrytown is handled by a Data 100 Model 78 system, with card reader, 400 line/min printer and two magnetic tapes. Each Keybatch system backs up the other so that data entry jobs can be switched in the event of hardware or software problems or changes.

A satellite plant in Ottawa, Ill., communicates directly with the Chicago system through remote CRTs, entering its own orders and doing its own billing. Pearson said the division is considering installing similar low-cost data entry stations in all outlying warehouses, giving the remote locations all the editing power now available at Chicago.

Late in 1977, the division will take delivery of 20M-byte disk units to meet the need for increased data storage. "We maintain over 6,000 batches of data on our Aesop system disk," he said. "On our invoices we have to print each customer sausage casing recipe. We're trying to keep

15,000 individual recipes on disk for instant recall, so we need plenty of storage."

#### Companywide Expansion

Union Carbide is proceeding toward a worldwide data communications network. A large Keybatch system was recently installed in Geneva, Switzerland, to support administrative and scientific processing through both the Tarrytown and South Charleston data centers. Soon to be in operation is a system in Hong Kong, with additional sites planned for Europe and Asia.

Continuing system development activity will see companywide standardization of certain applications such as payroll and personnel accounting.

A significant enhancement to the

company's printing capacity is planned for the new computer center being erected in South Charleston. Two Model 78 remote processing systems will each support two IBM 3211 printers, operating at 2,000 line/min over 50K bit/sec lines.

Printing capability of this magnitude has rarely been attempted anywhere in a remote system. "Practically all the printing will be done at the user's site instead of at the data centers," Bird said.

Service is important to Union Carbide because of its far-flung network, which places systems not only in large population centers like Chicago, New York and Houston, but in such locations as Centerville, Iowa; Cartersville, Ga.; Theodore, Ala.; and Freehold, N.J.

Data 100's field service organization will use an automated maintenance system that provides a near "real-time" method of responding to problems and reporting maintenance activity.

A user in any location now calls one central number when service is required. Maintenance personnel are immediately dispatched from the nearest Data 100 office, perform the maintenance, and file a complete call report, which then is processed by computer.

Every month, Data 100 provides Union Carbide management with a "report card," listing every machine in the network, how many calls are made to it, how long it took service personnel to respond, maintenance time and total downtime.

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Codex's new world champion for winning performance in data communications, the 6000 Series Intelligent Network Processor.

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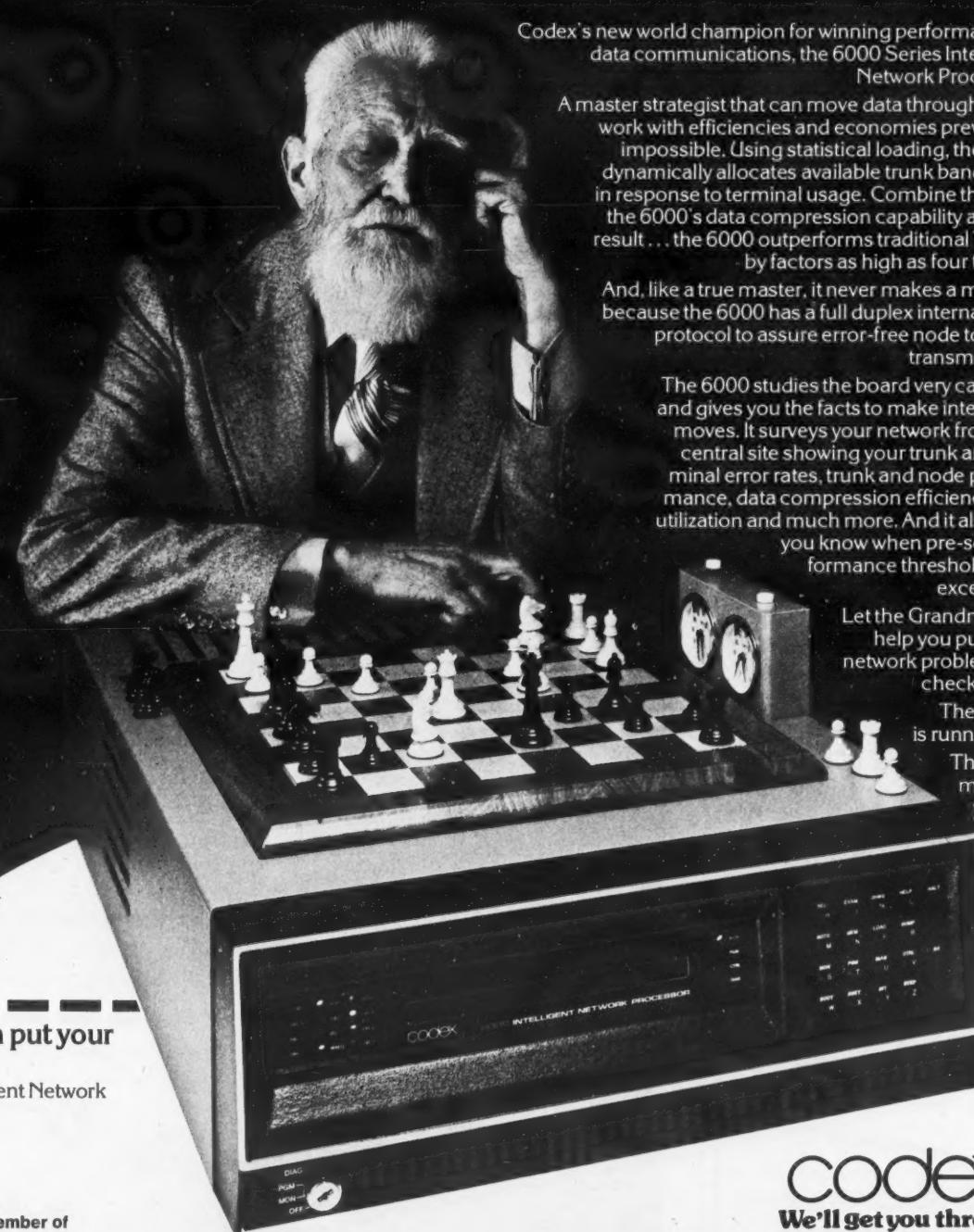
And, like a true master, it never makes a mistake because the 6000 has a full duplex internal ARQ protocol to assure error-free node to node transmission.

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## Three Nets In Buffalo

# Point-of-Sale EFT System Attracts Depositors

(Continued from Page S/31)

institutions at the end of the first three months.

The reason for the high number of retail cards is that Tops, which had in-store check approval files, now requires that anyone cashing a check in its stores present an Instacard for identification. The card provides positive identification through the use of the personal identification number (PIN). Since the system was installed, the cards have been used for over 332,000 check-cashing transactions involving \$33 million. Store managers report a notable decrease in the number of returned checks.

The institutions only issued Instacards to customers requesting them at the beginning of the program. They have, however, begun a campaign of issuing the cards to all statement account holders and will begin marketing their services to all holders of the Tops cards to try to convert them to institution accounts.

Datek, Inc., the data processing subsidiary of the two institutions, designed the system and created Instacard. Formed in 1973, Datek also serves a number of other organizations with data processing.

In the point-of-sale network, Datek is the processing arm, using its twin NCR Century 251 systems for day-end processing of the Instacard data. Two smaller Varian V-76 computers are on-line to the stores to record transactions and perform the check identification functions transmitted to them from NCR 279 financial terminals in the stores.

The entire system was designed and installed in less than a year, with programming and equipment configuration provided by Pan American Systems, a Florida-based software house. The interface between the smaller computers and the Century data processing system was written by Datek systems analysts.

### Reason for Dual System

The reason for two systems — one on-line to the in-store terminals and the other for processing the data — is economy, according to John S. Kuczanski, president of Datek. "The Century computers are on-line to the branches of both institutions," Kuczanski said, "taking their transactions. We also use them to process the data for all our customers. By installing the smaller computers, we free up the Century system to do the job it does best — big, high-volume processing."

The two computer systems do interface, though. A primary ledger of the Instacard accounts is maintained in the smaller system. All of the in-store transactions are posted in the secondary ledger, with each account having a daily withdrawal limit. To prevent a cardholder from withdrawing the limit from a store, then going to a branch to overdraw the account, the Century computer is programmed to check the secondary ledger before it allows withdrawals from the branches and to update the secondary ledger when branch transactions occur. Thus, it is virtually impossible to cheat either system.

At stated times during the day, the

secondary ledger is read to the Century CPU's file and processed.

An important point discussed in the planning of the network was the type of card to be used. "It's difficult enough to ask people to carry another card so they can access our system," according to Chase. "Some systems have separate cards and PIN numbers for each type of account, but we wanted to put the account identification for both checking and savings accounts on one card for customer convenience."

The NCR 279 terminals made this possible by their ability to read the full 40 characters on the American Bankers Association track 2. Up to 40 characters of information can be encoded on

the card's magnetic stripe and read to the computer when the card is passed through the card reader.

### Branch Loads Reduced

Kuczanski feels the point-of-sale network is also meeting the second objective set for it. "After only six months of full operation, we are already identifying reductions in branch loads," he said. "One branch of Western New York Savings is open Friday evenings, normally with five tellers on duty. The branch manager now feels he can reduce this to four tellers, yet the activity level on his accounts remains high. That's significant in this short period of time, and it proves we

are taking customers out of the branches and into the stores."

With the start-up experience behind them, the people at Datek and Instacard are working to expand the network as rapidly as possible. New stores are being added at the rate of one every two weeks until 32 Tops locations will be on-line. Instacard is also talking with other thrift institutions in the area, offering them the opportunity to join the network.

Plans are being made to expand services to cardholders. In addition to the deposit, withdrawal and check-cashing functions, the system will eventually support loan payments.

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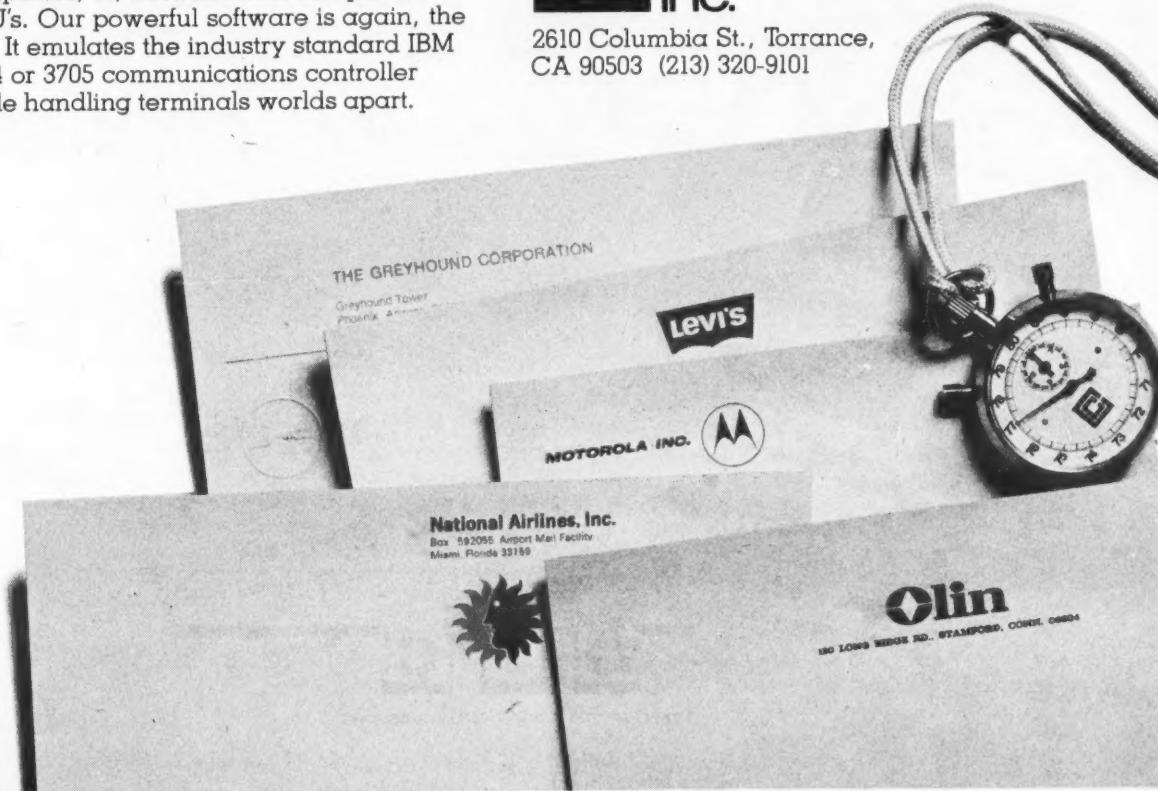
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# Multiplexers Improve Credit Data Transmission

(Continued from Page S/27)

However, most credit networks — TU, for example — don't necessarily recommend these bureaus use devices other than Bell System modems. One sane and cost-effective tactic the end user can implement is to simply replace the Bell devices.

The Merchants bureau of Bakersfield, Calif. slashed its current phone bill by 35% and at the same time, increased transmission capacity by 260%. The bureau, which is now part of TU's Chicago-to-Visalia hookup, installed Prentice Corp. Series-M FDMs, thereby reducing costs by multiplexing several terminals over the same voice-grade line.

The Bakersfield bureau was too small to have a node located at its premises

but was large enough to require instantaneous data. So, initially, it called directly into the Visalia node by using what is called Foreign Exchange Service (FEX). FEX, provided by Bell for about \$6 a mile, extends the dial tone from a distant point to where the user is located so that instead of making many long-distance calls, he can make unlimited local calls through the FEX line.

### Expansion Problems

The FEX approach was fairly cost-effective where there was only one terminal located in Bakersfield, accessing Visalia's data base intermittently throughout the day. However, as soon as the Merchants bureau began to grow and obtain customers of its own,

seeking access to the network, it found it had to add two more lines. The three lines combined were very expensive.

It is in a case like this where FDMs really shine. Prentice removed the three FEX lines and instead installed a single leased line between Visalia and Bakersfield. Then it installed Prentice M-Series FDMs on that line, interfaced to dial-up modems. This equipment offered basically the same type of service as FEX but on a larger scale.

For example, the Visalia site was given the capability to have 300 bit/sec terminals dialing in so they could contend for these three lines. Since it had three lines and three terminals, there actually was no contention.

The Merchants bureau could then go out and sell some local users — very ac-

tive users — on a direct access basis. It actually installed some terminals in user premises, allowing them to call in to the same three lines and obtain credit reports instantaneously rather than waiting or calling them in for next-day delivery.

### Beauty of Situation

The beauty of it was that once it added terminals out there, it was able to extend further, by selling teletypewriter — low-speed terminals — to other small users in the area that were using some other service then, perhaps having to call as far as the TRW credit system in the Los Angeles area.

But now the users had the alternative of calling directly into Bakersfield. Prentice did, in fact, install five 110 bit/sec lines, using this same single leased phone line. The cost was about one-third of the FEX they had before installation of the Prentice FDMs.

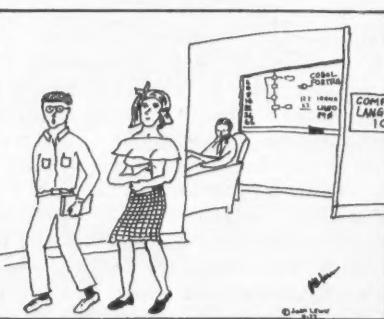
Before the Bakersfield bureau switched to FDMs, it could have functioned adequately. But merchants in its service area wanted faster response, and if they couldn't get it through Bakersfield, they were willing to call as far south as Anaheim to link with the TRW System. And because the TRW route meant lost revenue to the Bakersfield bureau, it decided it would not tolerate that loss.

Prior to the Merchants bureau automating, it made out manual reports, called the Visalia node — or some other bureau — to get manual information. Obviously, that isn't cost-effective. But when it automated, it kept its same basic personnel, cut down response time dramatically, and processed many more reports. All this made the bureau much more profitable.

The Bakersfield installation underscores another benefit of FDMs: When a bureau grows to where a node becomes cost-effective, it can then service those outlying customers, primarily retailers. When these merchants grow to where they are linked to the computer almost full time, they can then pick up an FDM link.

In addition, by using FDMs, bureaus can tie in many different users in their area with multipoint lines so that a widely dispersed user community is accessed cost-effectively. And because they will no longer require dial-ups, they can protect themselves from future increases in dial-up rates, which in the case of Bakersfield, won't be impacted for some time.

I think the question of when a local credit bureau is ready to switch over to FDMs is tough to answer because of all the variables. But in some cases the right amount of user pressure determines the crossover point.



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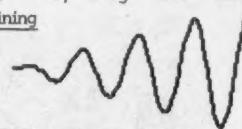
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## 'Pacuit' Switching Systems Operate Two Nets

EL SEGUNDO, Calif. — A proprietary technique for combining both packet and circuit switching in a single package is proving to be a major factor in the operation of two data distribution networks recently implemented in the U.S.

In both cases, the heart of the network operation is the M3200 Pacuit network switching and management

## Migrants' Records Tracked

LITTLE ROCK, Ark. — Children of migrant workers used to leave school by the sixth grade. Now, thousands of them finish high school and some even attend college.

The Arkansas Department of Education plays a major role in keeping these children in class by operating the National Migrant Student Record Transfer System. This is a nationwide computer-based network dedicated to improving the education and health care of migrant children.

Powered by an IBM system, the program helps make sure a student's educational and medical records arrive at a school soon after he does. More than 15,000 school districts in 46 states and Puerto Rico where migrant labor is used can obtain current scholastic and medical histories of more than 500,000 children. The schools use 152 communications terminals across the nation to get needed information in hours from the computer.

The success of the Migrant Student Record Transfer System has prompted officials to add programs for children of migrant fishermen and children living in U.S. possessions such as the Virgin Islands and Pacific Islands.

Teachers know immediately which schools a student has attended and which subjects he has studied. The system also includes grades and aptitude and achievement scores.

### Keeping Up

"Educating these children is difficult because they may change schools up to five times in a single year," Winford Miller, the system's administrator, said. "By the time a school learns a student's background and develops a plan to help him, he may be gone to another state."

"The system helps these children develop a positive attitude toward education because their new teachers can pick up where the old one left off. All the information arrives soon after the child does. The child couldn't possibly tell school officials all they need to know, and since 40% of the children come from Spanish-speaking families, the problem was severe," he said.

The Migrant Student Record Transfer System, a federal project, started in 1970 to deliver academic and health services. The system keeps track of how long students attended individual schools, whether it be weeks or months, and helps students receive the vital credits they need.

The system is constantly updated to serve the swelling demand from local school districts. The Department of Education mails out about 8,000 record forms daily. Student records now are stored in a newly installed IBM 370/158 and updated regularly. Sys-

tem, an automated digital traffic manager produced by Computer Transmission Corp. here for both common carrier and private data nets.

Called "pacuit" because it simultaneously packetizes data and directs the packets to a preselected computer resource via the most expedient route, the M3200 also functions as a network

manager, removing this function from the mainframe and enabling incompatible terminals and computer ports to communicate with each other through the incorporation of mini and microcomputer components.

The M3200 was first utilized by Pacific Telephone and Telegraph in a statewide digital data network which currently serves the 19 campuses of the California State Universities and Colleges, the California Department of Transportation and other state agencies. More than 200 remote I/O stations are operating on-line with the mainframe computer at the network control center in Sacramento.

Another M3200 network is located at

the University of Georgia. There are 10 campuses in the network at the University of Georgia system, including nine state and independent colleges and the Georgia Institute of Technology. The network has more than 100 terminal stations.

The Georgia network executes such applications as student registration, computer aided instruction, scientific calculations, accounts payable and receivable, budget forecasts and payroll. The central computer serving the network is a remote job entry and time-sharing system centered at the university's main campus in Athens, working the mainframe computers located at four other sites.

## The Versatile Generation.

Infoton's new generation of low price terminals does it all. The incredibly versatile 200 and 400 give you a choice of options unmatched in the industry.

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The 400 has everything the 200 has... and more. Built around the Z-80 microprocessor, it allows software designers to expand programs as needed without additional hardware. Capabilities include complete formatting and editing with block mode transmission. Also character mode for normal log-in procedures or straight character operation.

Last but not least. Both the 200 and 400 have prices among the lowest in the industry. Only \$795 and \$1,095 respectively in quantities of 100. Write or call for full details.



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## Mini Bits

### Mini/Micro Show Set Next Month

ANAHEIM, Calif. — The second annual Mini/Micro Computer Conference will be held Dec. 6-8 at the Anaheim Convention Center here.

Attendees can visit 142 exhibit booths and attend sessions on various aspects of minicomputers — selecting and evaluating a minicomputer, trends in mini-/micro software, how to keep an on-line system from crashing, the use of OEM peripherals in end-user systems and computer law.

Attendance at the exhibits costs \$5; show and program registration costs \$15 for one day and \$40 for all three days.

Additional information is available from Mini/Micro Conference, Suite 1, 5528 E. La Palma Ave., Anaheim, Calif. 92807.

#### Ohio Scientific Adds Drive

HIRAM, Ohio — A 74M-byte hard disk drive for small systems is available from Ohio Scientific.

The C-D74 provides a 35 msec average access time and a data transfer rate of 7.3M bit/sec. The unit uses Winchester technology, the firm said.

The Ohio Scientific drive costs \$6,000 from the firm in Hiram, Ohio 44234.

#### Unit Stores Cassettes

COMMACK, N.Y. — The Data Products Division of Robins Industries Corp has introduced a cassette storage center.

The Robins Storage Center is made of high impact-resistant plastic and holds 72 cassettes with boxes or 36 cassettes in containers, Robins said.

The unit can be wall-mounted or used freestanding. It was designed for computer rooms, DP centers and word processing installations.

The cassette storage center, designated No. 78-023, costs \$16.50 from Data Products Division, 75 Austin Blvd., Commack, N.Y. 11725.

## Mixed-Vendor System Hospital Picks Custom Mini

By Esther Surden

CW Staff

HAGERSTOWN, Md. — Now that Brook Lane Psychiatric Hospital here has put its payroll, mailing list and plant ledger applications to bed, the institution is beginning to bring its outpatient, inpatient and accounts receivable operations under control.

Designed for the hospital by an independent consultant, the hospital's minicomputer-based system includes hardware from many vendors.

The heart of the system is a 16K Interdata, Inc. minicomputer; peripherals include a Lear Siegler keyboard/CRT, two Shugart floppy disk drives and a Teletype Model 40 line printer.

The consultant, Robert Mack, designed the mini's operating system himself.

The hospital decided it needed a minicomputer because, although its mechanical accounting machine could keep up with the pa-

tient billing, "we couldn't get the general management reports and reports various government bodies required," according to David K. Gerber, controller.

Digging up the statistical information needed took too much time with the old system.

So the hospital looked around for a system to fit its needs. First it looked at an IBM System 32 in use at another hospital, but the stock types of programs available didn't "offer us the flexibility we thought we needed," Gerber said.

The IBM system also didn't operate "nearly as quickly" as

the system the institution has installed now, he said.

Mack contacted the hospital about installing a system, Gerber recalled, and the promised system seemed to be just what the doctor ordered.

These applications are presently up and running. The payroll program produces the checks for about 115 people every other week.

The mailing list application has about 1,500 names on file so the hospital can inform members of the clergy of its pastoral education program.

(Continued on Page 50)

## Auerbach Reconfigures Mini Report Services

PENNSAUKEN, N.J. — Auerbach Publishers, Inc. has divided its previously offered reports on minicomputers and small busi-

ness systems into two services, covering each topic individually.

The first service includes two volumes of reports designed to enable readers to evaluate business minicomputers. Reports cover the areas of small business computers, office computers and intelligent terminals.

A tutorial report on business minis explores recent trends and developments with these systems, the company said.

The second service, which also includes two volumes, provides information on general-purpose minicomputers from U.S., European and Japanese makers.

In this set of reports, users can find information on microprocessors, microcomputers and minicomputers, process control computers and minicomputer peripherals.

Detailed articles are provided on each product. These articles include a system overview, competitive analysis, configuration guide and maintenance, support and price data.

The reports are updated monthly, the company noted and late-breaking developments on the mini scene are covered in hotline reports.

The services cost \$365 each and are available immediately from the firm at 6560 North Park Drive, Pennsauken, N.J. 08109.

## DEC Adds LSI-11/2 Family, Runs RT-11 Software Subset

MARLBORO, Mass. — Digital Equipment Corp. has expanded its LSI-11 line with the addition of a family of microcomputers called the LSI-11/2.

The LSI-11/2 systems are said to be software-compatible with the LSI-11 and offer a price savings of up to 44% below the existing products.

A basic microprocessor unit (MPU), several microprocessor and memory configurations called the LSI-11/2 and a variety of memory modules the same half-width size as the microprocessor are available, DEC said. In addition, users can purchase matching-width card guide and backplane assembly.

The MPU, mounted on a 5- by 8.5-in. module, has been designated the KD11-HA. This unit is available without memory in quantities of 50 for applications requiring custom random-access memory (RAM) or read-only memory configurations, a

spokesman noted.

The LSI-11/2 units were designed to suit applications where space or cost is critical, the spokesman said. Hardware options include a serial line interface card with four RS-422/423 independently programmable channels and a kit for interfacing and control applications.

Under a subset of the RT-11 operating system, the systems can execute programs developed on a full RT-11 system. Called Runtime RT-11, the software permits programs developed in Macro-11, Fortran, Basic-11, APL and Focal to operate on the LSI-11/2, DEC said.

The LSI-11/2 microcomputer with 16K bytes of RAM costs \$851. The KD11-HA costs \$459 in 50-unit quantities; in 100-unit quantities the Runtime software can be licensed for \$97.

All the products will be available early next year from DEC's Components Group, One Iron Way, Marlboro, Mass. 01752.

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# Riverbend Farms Growing More Than Fruit

SANGER, Calif. — Fruit isn't the only thing that's growing at Riverbend Farms, Inc. here.

The data processing operation will be expanding soon too, from an IBM System 32 to the recently announced IBM System 34, according to Perry Walker, vice-president of Rivcom Corp., Riverbend's DP subsidiary.

Riverbend Farms started out growing fruit; now it is primarily in the fruit processing business. "In 1967, we started to process fruit for some of the area farmers and shipped about 20,000 cartons. By 1974, we were shipping more than three million cartons," Larry Harris, Riverbend president, recalled.

Rapid growth prompted the move to a small business system. The company chose IBM because of service.

"The heart and soul of our business is in the machine," Walker explained, "so we needed a vendor which was able to come out and fix the system when it needed fixing.

"We are dealing with a perishable product whose price changes quickly," Harris added, so the company also needed a system that would enable it "to make quick decisions with confidence."

At first the firm used a contract programmer to develop the specialized programs for its system. Because produce "is such a volatile business" and changes needed to be made on demand, however, the firm brought the programmer in-house, Walker said.

#### Firm Saw Potential

After that, the company saw the potential for developing programs for the industry, so it made the DP operation a subsidiary which does Riverbend's DP and sells software to others, both in and out of the produce industry.

In late March or early April, the firm's DP operation will receive an IBM System 34. Plans are already being made for the installation of the system, Walker indicated, and an analyst from the firm will at-

tend some training sessions in December and January on the system.

The reason for moving to the System 34 is to get more timely information, he added.

#### Pooled Produce

"One of the big problems in the packing business," according to Harris, "is getting enough information to growers. Part of the reason is that income from the produce is pooled.

"Since the growing season is long and complex, income from the produce must be pooled to be equitable.

"It wouldn't be fair, for example, for a grower whose crop was picked last month when prices were high to get a better price for his fruit than the grower whose crop is picked this month after prices have dropped slightly.

"We usually have an early maturity pool and a season pool, but some packers have monthly pools," Harris said.

"The growers used to say, 'We never know enough,' but now we have a meeting every Saturday. We furnish them with a listing showing a year-to-date summary of fruit delivered, packed and sold.

"They also know who delivered it to the packing house and when. It is very important to tell the grower his value of product packed at any given time."

Another valuable report produced by the system is the juice statement. Money is distributed from the juicing

operation to the proper grower depending on pounds of solids received and juice content.

This requires storing records on the system over an extended period. When juicing operations are completed, data on grower, variety and season are keyed into the system and a distribution report is produced by grower and prepares the necessary checks for payment.

"We use the system to produce an aged accounts receivable, and sales analysis reports," Harris said. "But, aside from grower accounting, I think our No. 1 need is payroll processing.

"We have as many as 400 employees working in the peak seasons. There is a great deal of turnover in the field crews. There is no withholding for field workers, but there is full withholding on workers in the packing operation.

"The System 32 was the first small system I found that seemed sophisticated enough to do grower accounting and handle an agriculture payroll. It was small and inexpensive enough to start with, yet had plenty of growth potential.

"We started with a 40 char./sec print capability and 5 million words of on-line disk storage. We've upgraded the system several times and now have 155 line/min print capability and 13M words of on-line disk storage.

"We also use an IBM 3741 as

input to the system to handle a remote packing operation."

## Process Unit Micro Based

FOXBORO, Mass. — The Fox 3 from The Foxboro Co. is a microprocessor-based process control system that can be added to the company's Spec 200 electronic control systems using a data communications link.

The Fox 3 features modular software, designed to "simplify system design and operation," the firm said.

All programming activities are performed in a high-level conversational language which combines process-oriented phrases and conventional algebraic expressions, a spokesman added.

A software display package provides preformatted displays on color or monochromatic CRT screens as well as the capability to develop special user displays for unique process requirements, he said.

Other features include on-line programmability and self-diagnostic troubleshooting, Foxboro noted.

The system ranges in price from about \$25,000 to \$50,000, not including I/O units. The exact price depends on how it is configured to a specific user's needs. Information is available from the vendor at Department 120, Foxboro, Mass. 02035.

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## Hospital Opt for Custom Mini

(Continued from Page 49)

In the future, the mailing list application will be used to keep physicians and other referral sources informed of the services the hospital provides, he said.

The third application on the system is the plant ledger. This was previously performed by a service bureau

and provides the institution with a listing of its assets and keeps track of the depreciation of all the items the hospital owns.

A generated report records the current value of each item and its replacement cost; that information is used for insurance purposes.

The next big step is the patient billing application, Gerber said, but "this will take us a while." The patient billing system will include inpatient and outpatient billing and accounts receivable applications.

The payroll application produces those necessary governmental reports including the firm's quarterly 941 reports and a quarterly report to unemployment. It also prepared the W2 forms at the end of the year.

A somewhat different aspect of the system is its ability to print out on each employee's paycheck the number of sick days, vacation days and holiday time not yet taken by the employee.

"We are pleased with the system's flexibility and what it has provided," Gerber said.

The only drawback is that the implementation schedule has lagged beyond what "we had hoped for."

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And Cuts Material Waste

## Clothing Firm's System Helps Shrink Inventory

MOUNT AIRY, N.C. — A clothing manufacturer here has achieved significant savings by reducing inventory and cutting raw material waste as a result of implementing a production planning system based on a small business system.

Spencer's, Inc. has built its system around a Univac 90/30 and two software packages — the Information Management System/90 (IMS/90) and Information Collection System/90 (ICS/90).

A vertically integrated concern performing bleaching, vat dyeing, pre-shrinking, cutting and knitting operations, Spencer's has been experiencing a growth rate of 15% to 20% each year.

The company employs 1,800 persons and has four plants — three in Mount Airy (two for clothing manufacture and a third for box production) and a fourth clothing manufacturing facility near Hillsdale, Va.

The firm installed its first system, an IBM System 3/10, in 1971 but by 1975, according to William C. Sigmon, DP manager, "we were running out of steam."

"Our workload had increased enormously, we needed more disk storage capacity and we wanted to have a communications-oriented machine," Sigmon explained.

"After looking at the major competitors, we selected Univac and its 90/30 system. We liked the ease of facilitating communications using the IMS/90 software package and we favored the vendor's "bundled" approach. We also preferred its spooling package and the growth capabilities of the system."

The 90/30 was installed in July 1976. It has a main memory of 163,000 bytes, three Univac 8418 disk drives with a capacity of 173.7 million bytes, an integrated card reader and printer.

Two Uniscope 200 visual display terminals along with a three-station UTS 400 cluster are connected to the processor. A five-station UTS 400 is now being installed to replace the remaining keypunch units.

### One-Shift Operation

"Since the 90/30 began operating, we have been able to accomplish all of our work in one nine-hour shift, five days a week with ample time available for additional applications. With the System 3, we had to run 1-1/2 shifts daily and work a half day on Saturdays, and this did not include several applications now running on the 90/30," Sigmon said.

"Another drawback with the old system was that new applications we wanted to run were backed up because of a combination of running out of time and not enough disk capacity," he continued.

"ICS/90 is the first applications software we have purchased and we feel it is well worth the price." It allows the user to change formats as needed and gives a great deal of flexibility, he claimed.

Sigmon also said he considered the Unique language used with IMS/90 extremely good and the OS/3 operating system "easy to use with good recovery procedures."

One of the key applications on the

90/30 system has been sales analysis for Spencer's own internal use and for all its customers.

"Every two weeks," Sigmon noted, "we provide our customers with a detailed history of their orders broken down by item and listing our sales to them by actual volume and dollar amounts."

"For our own sales staff, we perform a monthly sales analysis by territory, by customer and by item so we can keep abreast of the general sales picture and industry trends and find out those items that are fast movers and those that are lagging. In addition, we prepare a report on individual salesmen's performance semiannual-

ly," Sigmon said.

"Previously, we could only do a limited amount of sales analysis but now we can do it for more people in more ways, using a large detailed sales history file."

"The system has also given us the capability to do extensive production planning. This starts with our receiving a forecast in December of what the marketing department plans to sell during the year."

"This forecast information is entered into the computer, compared with historical performance and then 'smoothed' through the year, based on past achievements."

"We can then provide manufacturing

with data concerning the amount and type of material it will need to knit by poundage including sizes of material and widths of cloth," Sigmon noted.

Most Spencer orders are supplied from inventory. With the computerized production planning application, Sigmon said the company has been able to reduce its average inventory from 750,000 dozen items to 550,000 dozen.

Order entry information is presently keypunched. In the near future, the firm plans to use display terminals to directly input order data into the 90/30 using the ICS/90 program. Currently, a daily average of 400 orders is entered into the system.

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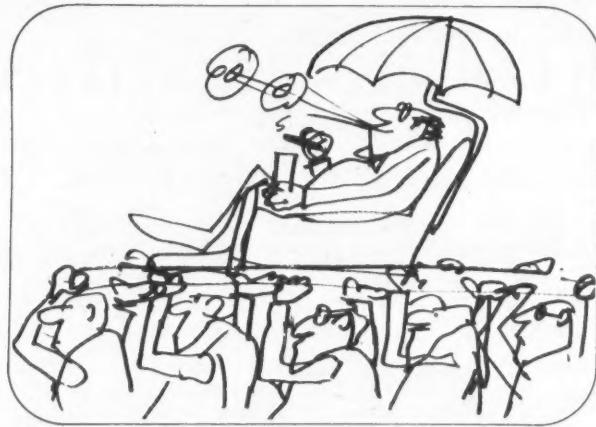
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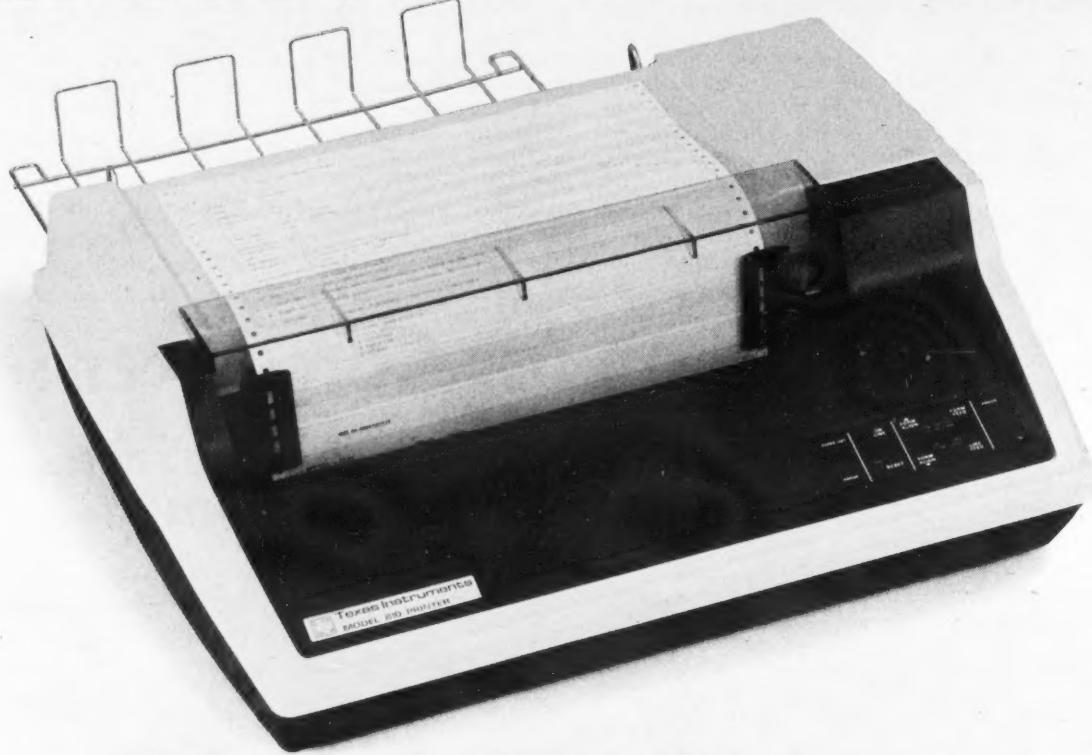


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# TEXAS INSTRUMENTS.

## Wholesalers Get Infomark Unit

EXTON, Pa. — Infomark, Inc. has unveiled the DMS 24, a turnkey business management system designed for order entry and inventory control applications at wholesale distributors and manufacturers.

Based on a Data General Corp. Nova 3 minicomputer, Control Data Corp.'s peripheral devices and Infomark's own operating system, the DMS 24 can support multiple interactive terminals, according to a spokesman.

The basic DMS 24 configuration includes the CPU, 32K bytes of memory, 10M bytes of disk, a 100 line/min printer and one CRT. It is reportedly expandable to 320M bytes of disk, 256K bytes of memory and up to 24 CRT terminals.

Printing speeds ranging from 100 char./sec to 1,100 line/min can be handled by the system, the spokesman noted.

### Operating System

The heart of the Infomark system is its operating system, according to the spokesman. Built around five interactive software modules, it was designed to provide "flexible" data preparation capabilities, on-line access to stored data, unattended batch processing of high-volume data, real-time updating and security against loss and unauthorized access to data, he said.

One module, the multiaccess editor, is the primary interface for the users of the DMS 24, the spokesman explained. It presents each user with an interactive business form selected from the applications library.

The form is used for data entry, edit or inquiry, the company said.

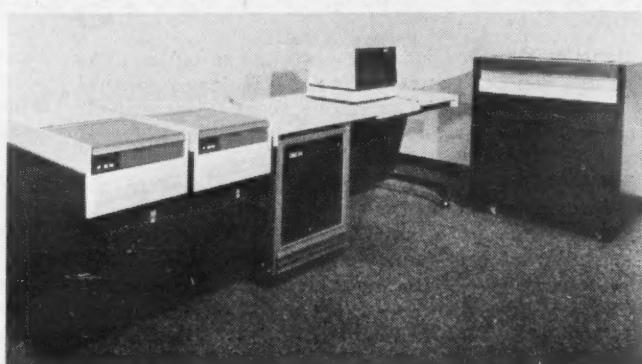
### Data Base Control

The Data Base Control Module supervises accesses to the data base, maintains file and record structure and organizes all files on a master/detail model with up to eight detail types handled, the spokesman reported.

A batch processing manager supplements the multiaccess editor, providing application access to the data base for high-volume processing requirements such as report generation or batch mode updates the company added.

The system is available with applications packages for general business, wholesale distributors and manufacturers and includes order entry, inventory control, accounts receivable, accounts payable, payroll, general ledger, bill of material and material requirements planning.

The basic system costs \$35,000. Infomark is at 319 N. Pottstown Pike, Exton, Pa. 19341.



Infomark DMS 24

## Radio Station Turnkey

SAN DIEGO — Automated Business Concepts is offering a radio station management system based on A.O. Smith Corp.'s Mesa Two small business system.

The turnkey system was developed to handle station sales, traffic, programming, logging, billing and music selection in addition to general accounting functions.

Designed for use by nontechnical station personnel, the basic system can process the daily activities of both AM and FM stations, according to a spokesman.

The basic system costs \$56,850 for a 64K Data General Corp. Nova 3 CPU, one CRT, a 10M-byte disk drive, 100 line/min printer, all software and installation. Automated Business is located at 8828 Complex Drive, San Diego, Calif. 92123.



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The VA317S is only the beginning, Ma. Before long, all Vadic dial-up modems will have built-in DAA's. Also, Vadic has designed a complete line of stand-alone, rack mount, and card form DAA's.

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# Mini, Audio System Provide Emergency Alerts

By JoAnn Roe Burkhardt

Special to CW

SEATTLE — Panic and confusion — not flames — are usually the worst killers when a fire alarm goes off in a high-rise building. When the Seattle Federal Office Building was being designed, engineers therefore included a minicomputer-based emergency control system that would motivate instead of frighten people.

Included in the system is an Instacart from IGM, a unit that plays recorded messages to direct people to elevators, the floor involved in the emergency and other floors as programmed.

The high rise's control room is located on the first floor of the 37-story structure, in quarters as impregnable as a fortress. To avoid entry

by unauthorized persons, doors to the control area open only by electronically coded cards.

A Honeywell Information Systems, Inc. 316 minicomputer controls and monitors the building's fire security and environmental systems. If a generator is low on fuel, an electrical problem develops, an air-handling system shuts down without explanation or a freezer temperature elevates, a CRT displays the trouble point and gives a hard-copy printout with appropriate corrective instructions.

Outside entrances are similarly monitored and warnings appear for such things as doors not fully latched.

When an emergency occurs, the computer calls up on the CRT a silhouette of the building, with a visual picture of

the location where the emergency has occurred. The CRT indicates whether it is a fire, smoke, security or mechanical problem and what device triggered the alarm.

On four projection screens in the control center are flashed color-coded schematic drawings of the emergency floor or specific equipment involved. The drawings show the precise layout plus the step-by-step instructions on the proper response to deal with the problem.

## Fire Emergency

If the emergency is a fire, the Seattle fire department is notified and told the precise location of the blaze. While the minicomputer is taking care of the above steps, certain relays simul-

taneously close to actuate the hard-wired portion of the control system, which includes the Instacart's playing of emergency messages.

A master matrix is integrated into the Instacart and, by the use of diode pins, messages are programmed to the appropriate floors.

When a fire alarm is received, all 22 elevators are "captured" and sent to the street floor. A message from an Instacart plays through the speakers in the elevator cabs: "May I have your attention please. The building manager has directed all elevators to the entrance lobby.

"There has been a fire [or emergency, bomb scare or whatever] reported in the building, and the elevators may be needed. Please proceed to the lobby area for further instructions."

Meanwhile, another tape is actuated based on which floor the emergency has occurred. There are three messages on a cartridge in one Instacart tray, separated by suitable cue tones, and one such cartridge for each floor of the building.

If there is a fire on the 16th floor, for example, the first message on the cartridge is played to that floor and the floor below:

"... There has been a fire reported on the 16th floor. While this report is being verified, the building manager would like you to proceed to the stairways and walk down to the 14th floor.

"Wait on the 14th floor for further instructions. Please do not use the elevators ..."

The second message goes to the 17th floor: "... There has been a fire reported on the 16th floor. The 18th floor is a safe area where you should wait for further instructions. Please do not use the elevators ..."

Then the third message is broadcast to the two floors receiving evacuees, in this case the 14th and 18th floors: "... There has been a fire reported on the 16th floor. People from other floors will be entering your area. Please remain at your desks while they are in your area. You are safe in your area."

The reason for the apparent paradox in directing personnel up from a fire is that sudden evacuation of a high-rise structure is impractical. There is the danger of panic and injuries, and the downward rush of people in the stairways would make it impossible for firemen to get upward to extinguish the fire.

## Real Bomb Found

Since its installation, the control system has seen actual use, not from fire, but from bomb scares. A bomb was found during one such alert but, fortunately, it failed to explode.

Two special cartridges are played to building personnel for bomb threats or similar emergencies, telling them to either leave the building until the following day or further notice or to go to a nearby structure.

The Honeywell 316 computer performs other yeoman tasks, like starting or stopping fans or closing dampers to pull smoke out of fire areas, while flooding adjacent areas with fresh air to aid firemen.

A reel-to-reel slow-speed audio logging recorder in the Instacart portion of the system records all emergency messages between firefighters or other personnel.



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MICROCOMPUTING

# Show Date Skirmishes Quiet — For Now

By Frank Vaughan  
CW Staff

Like the numbers on a wheel of chance at a county fair, next year's autumn microcomputing show dates have spun round and round. For a while, it appeared they might never stop spinning — or worse yet, might cause another season of battling shows in a rerun of the troubles that have plagued the personal computing industry and alienated the user.

The dust has settled and for the present, there are no show conflicts during the months of August, September or October. However, the potential for conflict increases as the show calendar gets increasingly crowded.

The conflicts came to a head this past summer, with the overlapping of dates between the Boston and Atlantic City shows. Then the Chicago and New York shows were scheduled head to head during the last week of October.

## Users Ignored

The end user has been almost ignored in all of this. Instead of meeting the needs of the user, many shows have aimed primarily at attracting the largest possible total nose count. When the show doors do open, ticket prices are high and there has generally been less than a full complement of exhibitors.

The list of main participants, each with his own individual causes, is difficult to keep track of, but here is a quick rundown of the principals, in no particular order:

- John Dilks, telephone company employee and prime force behind the past two Atlantic City shows.
- Jim Warren, editor of *Dr. Dobb's Journal of Computer Calisthenics and Orthodontia*, for People's Computer Co., prime force behind the West Coast computer fairs and publisher of *Jim's Industry Notes*.
- Wayne Green, publisher of *73* and *Kilobaud*, the force behind the Boston Show.
- Louise Garcia, employee of Benwill Publishing Co. (*Personal Computing Magazine*), coordinator of the Chicago show.
- Ralph Ianuzzi, employee of H.A. Bruno & Associates, a show company, organizer of the New York show.
- Carl Helmers, editor of *Byte*, which endorsed the New York and Atlantic City shows and was responsible for the technical program in New York.
- Virginia and Manfred Peschke, copublishers of *Byte*.

For a short while it appeared that much of the poor scheduling that has plagued the show circuit would cease to be a problem in 1978. Dilks nailed down the last weekend in August as his "property" for the next few years and much of the industry seems will-

ing to support his Atlantic City venture despite some criticisms of the city and facilities by both vendors and visitors.

The attendee can take heart in the knowledge that Dilks is banking on the hope that the recently approved legalized gambling will pump enough sorely needed money into the city to help it get back on its feet. Dilks has also moved the 78 show out of the Shelburne Hotel and into the convention center.

Green, on the other hand, has made no

show could be moved.

Warren was able to shift his show to the first weekend in November, hoping that Ianuzzi could move one week in the other direction. The two-week difference in show dates was necessary to permit the exhibitors to truck their exhibits from New York to Los Angeles, as opposed to sending them by air freight, which is reportedly more costly.

Unfortunately, the preceding week was booked at the Coliseum, leaving Ianuzzi out in the cold. He then began looking for other dates and found that the only other week available to him was in mid-September, the same week that, unknown to him, Garcia had booked her show.

Several telephone calls later, the problem was resolved. The Chicago show was moved one week later and the autumn schedule was set.

A current rundown of the autumn shows gives the following: Atlantic City, Aug. 25-27; New York, Sept. 15-17; Chicago, Sept. 21-24 and Los Angeles, Nov. 3-5.

There are still some unknown factors such as Green's plans, the entry of other shows and potential conflicts during the other nine months of the year. In addition, the head-to-head competition between Green's and Peschke's publications, which has spilled over into the show circuit, may create future problems.

The potential is being rapidly diminished, however, by the position *Byte* has taken on show endorsements. "Byte is not in the show business nor is it attached to any specific show," Helmers recently pointed out. "Byte will only endorse shows which are in the best interests of the industry."

So the autumn show dates are set and all is quiet for now. Yet there is still the possibility that someone will give the "wheel of chance" another spin. That could only harm the user.

## Analysis

public announcement of any firm dates for a follow-on to his Boston show. In all probability, should Green decide to hold another show, he will veer away from the autumn months and focus on the spring or early summer dates.

Warren announced two West Coast show dates for 1978, one in the spring and the other during the last week of October. He made his show announcement as soon as he established his dates in an attempt to head off any conflicts, also taking advantage of the Atlantic City show to help publicize his dates.

During the Chicago show, Garcia announced that her show dates for 1978 would be moved from the end of October to mid-September so as to avoid a conflict with Warren's show on the West Coast.

Then the trouble began.

Ianuzzi found himself completely blocked out of show dates. His agreement with the Coliseum gave him the first option on the last weekend in October, but Warren's show ruled out the use of those dates. He then contacted Warren to see if the West Coast

## Shugart Double-Sided Drive Has Double Density Heads

SUNNYVALE, Calif. — Shugart Associates has announced the availability of a double-sided, double-headed, double-density floppy disk drive that is capable of reading and writing data on both sides of a minifloppy diskette without it having to be removed from the drive.

The SA450 minifloppy drive uses two proprietary glass bonded ferrite ceramic read/write heads in its operation and will store up to four times as much on-line data, or 440K bytes unformatted, as does a conventional single-sided minifloppy drive with a storage capacity of 110K bytes.

The SA450 does this using 35 tracks, the

same number as a single-sided drive, a spokesman claimed. These figures are based upon a comparison by the firm with its own SA400 disk drive.

The SA450 can operate in a single-or double-density recording mode on either side of a minifloppy disk. This is made possible through the use of two read/write heads that are mounted in a stainless steel flexure and loaded onto the disk when the drive is operable. Loading time of the heads is 50 msec with an average track-to-track seek time of 25 msec, the firm said. Data can be transferred to or from a disk at the rate of

(Continued on Page 57)

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**B**

**Btam (Basic Telecommunications Access Method)** — An IBM designation that refers to the use of macro instructions to achieve data communications with specific terminals.

**bubble memories** — Such memories are actually tiny cylinders of magnetization whose axes lie perpendicular to the plane of the single-crystal sheet that contains them. Magnetic bubbles arise when two magnetic fields are perpendicular to the sheet. A constant field strengthens and fattens the regions of the sheet whose magnetization lies along it. A pulsed field then breaks the strengthened regions into isolated bubbles, which are free to move within the plane of the sheet. Because the presence or absence of bubbles can represent digital information, and because other external fields can manipulate this information, magnetic bubble devices could find uses in future data storage systems.

**buffer** — A "machine" designed to be inserted between other "machines" or program elements to match impedances, peripheral equipment speeds, to prevent mixed interactions, to supply additional drive or relay capability or simply to delay the rate of information flow. Buffer types are classified as inverting or noninverting.

**bug** — 1. A program defect or error. Also refers to any circuit fault due to improper design or construction. 2. A mistake or malfunction. 3. An integrated circuit.

**bus** — 1. As applied to computer technology, one or more conductors used as a path over which information is transmitted. 2. A circuit over which data or power is transmitted. Often one which acts as a common connection among a number of locations (Synonymous with trunk.) 3. A path over which information is transferred from any of several sources to any of several destinations.

**byte** — An IBM-developed term used to indicate a specific number of consecutive bits treated as a single entity. A byte is most often considered to consist of eight bits, which as a unit can represent one character or two numerals.

**byte multiplexing** — Refers to a procedure in which time slots on a channel are assigned to individual slow input/output devices so that bytes from one after another can be interlaced on the channel to or from main memory. Such a procedure is used on several IBM 360 and 370 systems.

## LEARNER'S LEXICON

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**COMPUTERWORLD**  
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## Hobby Havens

As a service to hobbyist readers, Computerworld periodically will list the micro clubs in different parts of the country.

Clubs wishing to be included in this listing should send their name and address as well as the name and address or telephone number of a contact person to Frank Vaughan at Computerworld, 797 Washington St., Newton, Mass. 02160.

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Arkansas Computer Club (ACC). Contact: Elmer Wingfield, 26 Belmont Drive, Little Rock, Ark. 72204. Telephone (501) 562-4260.

### CANADA

Club d'Informatique de la Mauricie (Ciam). Contact: S. Brousseau, 3795, Jean-Talon, Trois-Rivieres, Quebec G8Y 2G8. Telephone (819) 375-1019.

### CONNECTICUT

Bridgeport Area Society for Involved Computerists (Basic). Contact: Basic, Attn: Al Song, 12 Wildwood Drive, Trumbull, Conn. 06611.

Connecticut Micros. Contact: George Ahmuth, 8711 Wendy Lane, Westport, Conn. 06880. Telephone (302) 227-8534.

### FLORIDA

South Florida Computer Group. Contact: Bruce Cameron, P.O. Box 236188, Miami, Fla. 33123. Telephone (305) 324-5572.

### IDAHO

Pocatello Microcomputer Club. Contact Dr. Joel Shecter, Idaho State University, Box 8020, Pocatello, Idaho 83209. Telephone (208) 236-3730, 236-3585.

### MASSACHUSETTS

Greater Boston Computer Group (GBCG). Contact: Vin Moscaritollo, 59 Bellvieu Road, West Roxbury, Mass. 02135. Telephone (617) 325-2155.

### MICHIGAN

Mid-Michigan Computer Club. Contact: Tony Preston, 15151 Ripple Drive, Linden, Mich. 48451. Telephone (313) 735-5279.

### MINNESOTA

Minnesota Computer Society. Contact: Jean Rice, Box 35317, Minneapolis, Minn. 55435. New telephone (612) 941-1051.

### NEVADA

Northern Nevada Amateur Computer Club. Contact: A. Brady, c/o UNSCC, P.O. Box 9068, Reno, Nev. 89507.

### NEW JERSEY

Amateur Computer Group of New Jersey. Contact: Sol Libes, 995 Chimney Ridge, Springfield, N.J. 07081. Telephone (201) 277-2063.

### NEW YORK

New York Amateur Computer Club. Contact: John Frederick, Box 106,

Church St. Station, New York, N.Y. 10007.

Ithaca Computer Group. Contact: S. Edelman, Box 91, Ithaca, N.Y. 14850. Telephone (607) 273-3271.

Westchester-Fairfield Amateur Computer Society. Contact: C.B. Hensley, R.R. 1, Pound Ridge, N.Y. 10576. Telephone (914) 764-4213.

Long Island Computer Association. Contact: Aileen Harrison, 36 Irene Lane East, Plainview, N.Y. 11803. Telephone (516) 938-6769.

### NORTH CAROLINA

Triangle Area Computer Club (Tacc). Contact: Ed Comer, 4818 Ferncrest Drive, Greensboro, N.C. 27410. Telephone Andy Pitts (919) 765-1277.

### PENNSYLVANIA

Pittsburgh Area Computer Club. Contact: Fred Kitman, 216 Beech St., Pittsburgh, Pa. 15218.

### WEST VIRGINIA

West Virginia Computer Society. Contact: Bill England, 167 Iroquois Trail, Ona, W. Va. 25545.

## Shugart Adds Minifloppy

(Continued from Page 55)

125 or 250 kbit/sec, depending on the density selected, it added.

The read/write assembly maintains its position while in operation through the use of a spiral cam. This cam incorporates a V-groove that is fitted with a ball bearing follower attached to the head carriage assembly. When accessed, the cam, driven by a stepping motor, rotates in precise increments to the assigned track location on the minifloppy disk, the firm said.

The SA450 uses a 5.25-in. double-sided minifloppy media the same size as that of a single-sided disk. These disks are manufactured in three forms: soft-sectored, hard-sectored with 16 holes or hard-sectored with 10 holes.

## Oliver Offering Prom Systems

GLENDALE, Calif. — A series of piggyback programmable read-only memory (Prom) programmers that reportedly plug directly into any 2708 or TMS-2716 memory socket are available from Oliver Audio Engineering, Inc.

The Prom to be programmed is placed in the zero insertion force socket and the data is dumped over the eight lower address lines using a proprietary interface technique, the firm said.

No additional power supplies are needed and all timing and control sequences are handled by the programmer, a spokesman added.

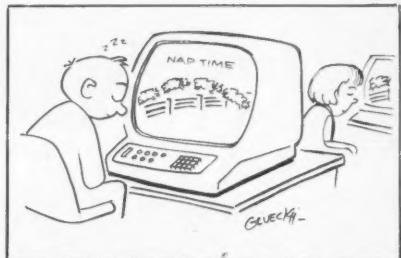
Each unit comes with a dc-to-dc switching regulator, 10-turn cermet trimmers for voltage and pulse width alignment and a zero insertion force socket. A 5-ft ribbon cable connects the programmer with the Prom socket via a 24-pin plug, the spokesman said.

Packaged in an aluminum case, the unit sells for \$249 in kit form and \$295 assembled, tested and aligned from Oliver Audio Engineering at 676 W. Wilson Ave., Glendale, Calif. 91230.

## Shugart Adds Minifloppy

An activity light and a write protect circuitry are standard features of the disk unit.

Price for the SA450 is \$450 with delivery in 90 days. OEM discounts are also available Shugart Associates said from 415 Oakmead Pkwy., Sunnyvale, Calif. 94086.



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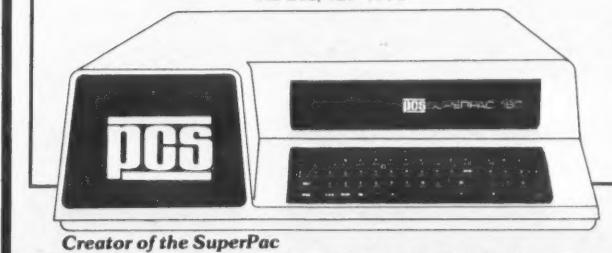
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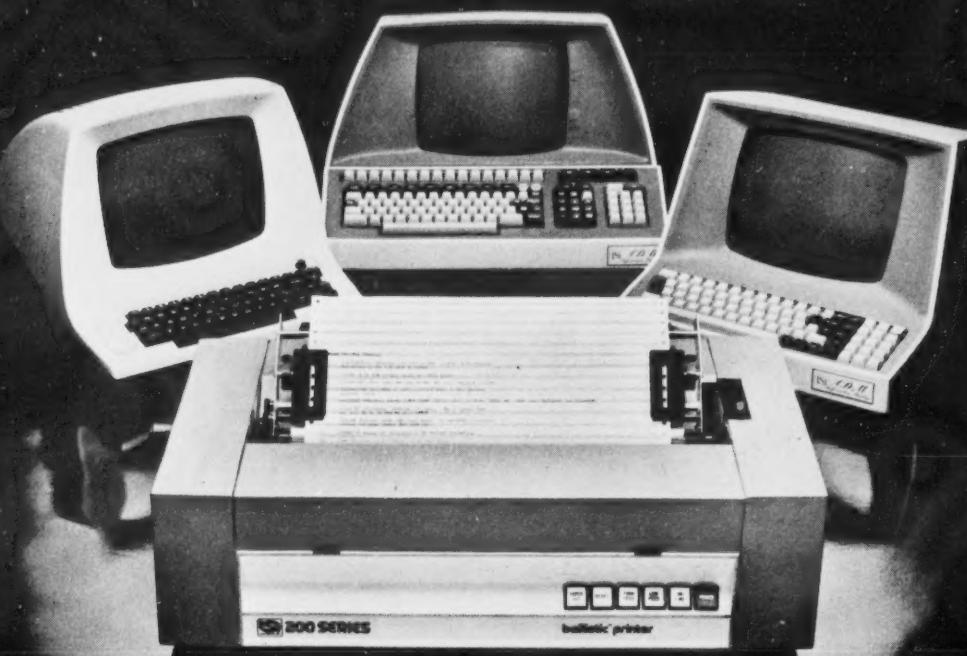
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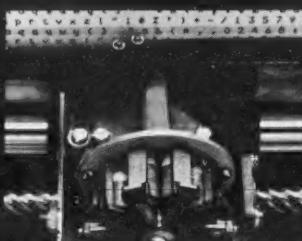


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# COMPUTER INDUSTRY

With Rapid Changes

## User Decisions Seen Harder Than Ever

By E. Drake Lundell Jr.

CW Staff

LOS ANGELES — Rapid technological changes in the last few years are making it harder than ever for users to make the right decisions on equipment and services, according to Stanley Mantell, vice-president of Input, a market research firm.

Speaking at the Computer & Communications Industry Association annual meeting here, Mantell added that "most users don't have all the in-house re-

sources necessary" to make those decisions in the rapidly changing environment.

Some of the issues that face, and apparently perplex, many

data base management systems and new communications alternatives such as value-added networks, Mantell said.

In the area of distributed proc-

Users have to decide between distributed processing with centralized control and decentralized processing with decentralized control, he indicated.

But at the same time, Mantell said the centralization of DP resources is still being encouraged by large mainframes and their latest systems.

In just the last two years, he noted, the price/performance of systems has improved fourfold, with the new 30 series from IBM having four times the power of the 168-3, introduced just two years ago.

Along with this increase in performance for the same price, users saw the residual value of their large systems drop as much as 30%, he said, noting that this created a confusing situation for users to evaluate.

And in the future, Mantell predicted that this rate of price/performance improvement could even increase, particularly as Japanese firms enter the U.S. market in the 1980s.

Another factor contributing to user confusions is the strong growth of the nontechnical DP

(Continued on Page 60)

## CW at CCIA

users include the move to distributed processing, the new price/performance of large mainframes, developments in the area of hardware/firmware/software,

essing, Mantell said users have to grapple with an issue that is not solely technical, but rather one that is "a strong emotional issue with many companies."

## Communications Industry Charged With Lack of Systems Creativity

LOS ANGELES — "With a few notable exceptions, the communications industry has not been known for particularly creative systems thinking," Dr. George E. Mueller, chairman of System Development Corp., told the Computer & Communications Industry Association meeting here last week.

The industry and users of communications services are generally concerned with problems, "usually to the exclusion of opportunities," Mueller told the more than 60 industry executives attending the session.

At the same time, however, Mueller charged that the industry has been "concentrating far too much on what is efficient — almost to the exclusion of basic human motivations."

And so to meet the needs of the future in communications, the industry and users need to be more creative, and "that creativity must be based on a deeper perception of what people really want," Mueller said.

Mueller pointed out that "at great expense, our cities have been completely wired" and while they may not have been

wired the way it would be done today "certainly no one proposes that we rewire them."

The resource, therefore, is there, he said, if it would only be used creatively by the people in the industry and users.

However, most of the "touted" communications developments of the past decades have really not been developments but rather "artifacts of an earlier

era," Mueller charged.

For example, automatic telephone dialing was invented by an undertaker in 1915 and facsimile transmission has been around since the '30s, he said.

"Nor am I convinced that some of the improvements are really improvements when you get right down to it," he added.

"The automatic PBX, for example,

(Continued on Page 60)

## Federal Computer Base Grows 5.5%

By Molly Upton

CW Staff

WALTHAM, Mass. — The number of general management computers installed in the U.S. government in fiscal 1976 grew 5.5% to 3,829, easily outpacing the total U.S. general-purpose industry's actual 1% decline in units installed, according to International Data Corp.'s *EDP Industry Report* (EDP/IR) newsletter.

The growth rate was the highest for the government since the late 1960s, according to the market research firm here.

The government seems to lean toward large units; IDC

calculated the price per system at nearly \$1.5 million. Government net expenditures on general management computers, whose definition is basically the same as that of IDC's general-purpose category, totaled \$290 million, according to the firm.

Including special management systems — minicomputers and dedicated application computers and "all other computer-based systems used in various operational environments" — the government's installed base of computers reached 9,650 units, an 11.5% rise over the fiscal 1975 total, according to the newsletter.

But the value of the govern-

ment inventory rose only 9% to \$4.41 billion, IDC said, using figures derived from the General Services Administration's "Inventory of Automatic Data Processing Equipment in the U.S. Government."

The unit growth rate of 11.5% in the federal government installed base was less than half that of the total computer industry growth rate, according to EDP/IR.

IDC attributed the lag to the frenetic 32% rate at which minicomputers are being installed in the industry sector, where they now comprise 70% of

(Continued on Page 60)

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# Communications Industry Told to Be Creative

(Continued from Page 59)

ple, has simply replaced a person who knew where people were with a machine that doesn't," he noted.

Truly innovative services, he said, always seem to stay on the drawing boards and "never quite make it to the marketplace where they are so badly needed," he said.

Today the business is faced with a "great revolution in the way men communicate," he said.

## 'Mind-Boggling' Impact

"Businesses are just barely beginning to exploit computer-controlled communications networks, but you all know what these tentative beginnings have meant to the communications industry already. When the revolution extends to the general public, the impact will reach mind-boggling proportions," he said.

"Yet it might not happen," he warned, since "the communications industry, which would be the primary beneficiary of such a revolution, may well be the force that suppresses it."

As an example of how this might happen, Mueller pointed to the furor over the data encryption standard.

"Incredibly, we have become embroiled in a controversy over whether the key is long enough," he said.

Because of the controversy, "there is a real danger that the standard won't

be widely used," even though it is the best available and is "certainly more than adequate" for most users, he continued.

"Such hesitation could actually slow the growth of the communications industry," since some firms may withhold some business functions from computer communications systems because they think they are not protected enough.

"If a corporation is 'forced' to withhold some functions," how can we reasonably expect it to be enthusiastic about investing in a broad computer-controlled network linking all its facilities and organizations?" he asked.

(Continued from Page 59)

user, Mantell said.

With the development and strong growth of management information systems and data base management systems, general management without a computer background is becoming more and more involved with systems, he said.

These people have less time and patience to spend with the systems, he said, and therefore systems have to be developed to allow them to communicate easily with computers.

Another factor in the user confusion equation is the growth of network architectures, he indicated, since with such things as Systems Network Architecture from IBM there is a migration of computing capabilities out of the host computers into communications controllers and even into terminals themselves.

And similarly, there is a move to more firmware in systems that Mantell predicted would eventually lead to processors that are developed for only one function or industry.

The increasing use of firmware can be seen with the IBM VM assist and MVS system Extensions operating

Furthermore, worry over the standard may prevent the development of some new innovative applications.

One of the reasons for not doing more creative work in the area of communications is that such services might run afoul of the 1934 Communications Act, he said.

But while admitting that there "is risk," Mueller said "the laws" currently on the books "simply are not relevant to the revolution we are anticipating" and that there are "no laws that prohibit us from being creative."

But that creativity "must be based on a deeper perception of what people really want," he added.

The whole CB revolution shows that

people have "a desire for much better and freer personal interaction than we have now," he said, adding "I also think it reveals a desire for such interaction with more than one person at a time.

"These needs must be satisfied in some manner," Mueller concluded.

"And it will take far greater creativity and innovation than has been evidenced heretofore. The communications industry must not follow the pattern of the railroad industry, simply developing newer Pullman cars. Such a passive approach would not only depress the industry, it would deny, or at least significantly delay, a revolution in the way man lives and works."

## Changes Making User Decisions Tougher

(Continued from Page 59)

systems he said, adding there are already industry-specific functional processors for the seismic DP field.

As this trend continues, it will raise a number of issues, because such systems would have a great deal of impact on user software that is already in place.

In addition, such developments also tend to support a centralized computer philosophy, he said, and the integration of more functions into firmware will serve as a barrier to competition "to some degree."

With increasing use of firmware in the systems, the problem of program portability will become even greater than it is today, he added, noting that such a move would impact both systems and applications packages that are either user- or industry-developed.

### Communications Use

The growth in the use of communications is also a factor contributing to user confusion, Mantell said.

On the one hand the use of local intelligence in terminals and the like reduces the cost of communications, but at the same time the total communications costs are going up in many firms,

he said.

But in the future, if communications cost drop, cheap communications could be a factor driving firms toward centralized DP, he added.

At the same time, the increased use of communications will push toward a move to provide more office automation and to combine word and data processing systems into one large network, he indicated.

Little has been done to automate the office to date, Mantell said, even though a great deal of automation has taken place in the factory. Because of this there is a great deal of opportunity in this area for increased labor efficiency, he added.

Overall, Mantell said users are now entering the age of cheap computer power which will give them more choices in the future. At the same time the split in the market between DP, communications and office function "will no longer hold" as those functions become integrated.

## Federal Systems Increase 5.5%

(Continued from Page 59)

the unit base.

Including minis, computers in the government are growing at only a 10% to 11% rate, "which means they are rapidly decreasing (over 10% annually) in number relative to the total U.S. installed base," EDP/IR observed.

Similarly, the 8% to 9% rate of growth in installed value means the government's inventory "is slowly (less than 1% annually) decreasing relative to the total U.S. installed value," the newsletter said.

In fiscal 1976, the number of special management computers in the government rose 16% to 5,819, while general management computers grew 5.5% to 3,829.

The value of general management computers installed in the government rose over 10% in fiscal 1976 to \$3.18 billion, EDP/IR said.

The government's position of predominance as a user is still unchallenged, but is dwindling. IDC indicated the government holds just under 4% of the U.S. installed base of all computers in fiscal 1976, down from 8.4% in 1970.

However, the government continued to account for 11% of the installed value, down from 13% in 1970.

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## Ended in Bankruptcy

# Dallas Firm Had Hard Ride During 1969 Ups, Downs

By Molly Upton  
CW Staff

The history of Scientific Control Corp., a Dallas firm whose stock rose as high as \$68 a share, is reminiscent of a roller coaster and brings to mind the heyday of the late '60s and then the hard times of the early '70s.

On paper, Scientific Control Corp. (SCC) seemed to have almost everything — a large time-sharing system that reportedly could serve 265 users simultaneously, a 16-bit minicomputer oriented to real-time scientific and control applications and the DCT-132, an internally programmable remote-batch terminal.

During the late '60s, firms were sprouting up right and left, and stock analysts were hard pressed to gather firsthand knowledge of firms.

Stockholders of SCC later sued Merrill Lynch, Pierce, Fenner & Smith, Inc. for stock manipulation and won \$1.5 million.

Recently the Securities and Exchange Commission (SEC) censured the brokerage firm and some employees and ordered it to reimburse customers another \$100,000.

SCC began public trading in December 1967, when its stock was about \$7.50 a share. In retrospect, the firm was perhaps best known for its strong earnings projections — which more often than not somehow failed to materialize.

Losses soon eclipsed the projections and a downhill slide began, involving bankruptcy and financing from a subsidiary of the Penn Central.

Exactly what happened to SCC is unknown to *Computerworld*, which up until 1970 followed the firm with a sizable amount of ink. The saga of SCC, as reported in CW, follows.

In September 1968, the firm signed a \$2.5 million contract with Electronic Memories, Inc. for core memory stacks to be used in its SCC 4700, a 16-bit computer designed for real-time scientific and control applications.

### Picture in '69

Things were looking bright the first part of 1969.

The firm announced its first customer for its Model 6700 time-sharing computer in January 1969. The customer of the \$2 million contract was Information Industries, Inc., SCC said. The 6700 could serve 265 users simultaneously at a rate of 5,000 instructions per second.

In May, the firm announced its DCT-132 internally programmable remote terminal, which SCC said could be compatible with all computers and handle data transmission up to 4,800 bit/sec. The basic system consisted of a controller, card reader, line printer and coupler for a modem.

As late as August, the firm's President William C. Lee was reaffirming SCC's earlier sales projections of more than \$20 million for fiscal 1970.

Between June and August, the firm announced sales to four customers of more than \$11.2 million in computers and communications equipment.

In August, SCC sold 100 of its DCT-132s for a value of \$2.4 million to one customer. The firm said its aggregate

backlog was \$17.7 million.

Mentioning the \$2.4 million contract as well as another one for \$2.27 million, Lee stated, "As these two sales demonstrate, our forecast of tripling sales from 1969's \$7 million level was extremely conservative."

### Losses Grew

But in October, it became apparent that losses were growing.

For the year ended April 30, 1969, the firm showed a loss of \$1.6 million on revenues of \$6.9 million compared with a \$21,755 loss in 1968 when revenues were nearly \$4 million.

And the pace at which losses accumulated quickened. In the following quarter ended July 31, 1969, losses grew to \$1.6 million on \$2.5 million in revenue compared with a \$69,499 loss in the same period in 1968, when revenues were \$2.2 million.

The annual report, which appeared in October, said much of the year's loss was attributable to expenditures of \$1.3 million on product development and \$1.2 million on a marketing team.

During the year, the firm had acquired a maker of cabinets and signed an agreement in principle to acquire Graham Magnetics, Inc.

The firm was also constructing an 80,000 sq ft addition and had expanded its number of employees from 285 to more than 830.

Things got worse.

In November, the firm laid off about 25% of its work force and filed suit against Commercial Credit Business Loans, Inc. and its parent company, Control Data Corp., charging them with breach of contract and fraud.

The suit was prompted by a notice from Commercial Credit that it would not consummate a \$4.5 million loan that had been previously agreed upon, SCC indicated.

SCC sought a total of \$41 million in damages and indicated it was no longer considering granting to Commercial Credit or CDC a license to manufacture and market its DCT-132. The license was to have been granted in connection with the loan.

### Chapter 11

In late November, SCC sought the shelter of Chapter 11 of the bankruptcy laws, by which it would be granted protection from creditors while formulating a plan to pay its debts. Among its creditors was Graham Magnetics, which held a \$1 million unsecured note.

SCC's stock fell to about \$12 a share.

Then in December, the firm settled its lawsuit with CDC and Commercial Credit, receiving a cash advance in the "hundreds of thousands" of dollars. The suits were dropped and Commercial Credit relinquished a license to manufacture and sell the DCT-132.

SCC closed its doors, unable to pay \$200,000 in back wages to about 600 employees.

The year 1970 was spent trying to get out from under.

Under the bankruptcy plan, SCC would issue 2 million shares of its common to Great Southwest Corp., a land developer that was 80% owned by

## Merrill Lynch to Pay Up

WASHINGTON, D.C. — The Securities and Exchange Commission (SEC) ordered Merrill Lynch, Pierce, Fenner & Smith, Inc. to repay customers up to \$1.6 million for losses on a computer maker's stock the SEC said was recommended in the late '60s without sufficient investigation.

The amount includes \$1.45 million that the brokerage firm previously had agreed to pay in settlement of a class action suit by stockholders of the firm, Scientific Control Corp. (SCC), Merrill Lynch stated.

SEC estimated Merrill Lynch customers bought about 400,000 shares, or nearly 33% of the total outstanding SCC stock, and incurred losses of more than \$9 million.

SCC's stock had reached \$68, but then dropped to about \$12 as the firm's true financial picture came to light.

### Consent Order

The SEC's consent order found the firm had violated antifraud and other aspects of the federal securities law by recommending the stock to its customers. The SEC censured the firm and 22 employees and penalized seven others.

Merrill Lynch and the employees involved consented to the action without admitting or denying the commission's allegations.

According to the charges, the employee responsible for following SCC's stock did not scrutinize company earning projections.

Penn Central, in return for \$2 million. Great Southwest would acquire just over 50% of SCC's shares, according to the plan.

Ernest E. Specks, new secretary of SCC, indicated the firm received many offers to buy its assets but accepted none. The firm had assets of \$13.4 million and debts of \$11 million including \$7.1 million in claims of unsecured creditors, he said.

Meanwhile, stockholders had filed suit against Merrill Lynch.

In January, SCC reopened its doors with a smaller staff. The firm told the court it shipped \$653,000 worth of products during the first 12 days of renewed operations.

However, all was not well, as became apparent in November 1970 when Great Southwest's liquidity problems came to light.

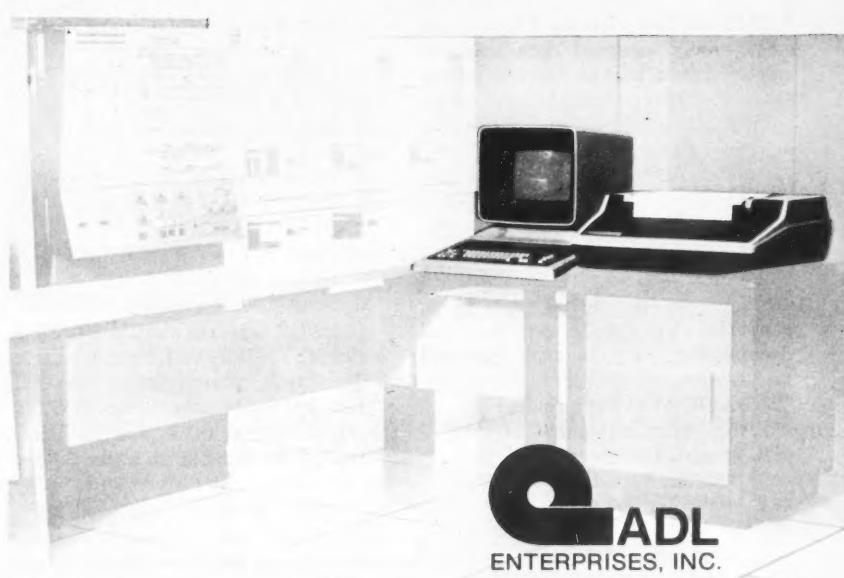
SCC announced it had reduced its workforce to a skeleton crew of 10 to 20 in the engineering, manufacturing and accounting departments.

Harris Intertype Corp. took a quick look at SCC, but managed to escape, complete with its \$100,000 loan.

Although the Great Southwest reorganization enabled SCC to reduce its debt by about \$2.1 million, its debt reduction "correspondingly reduced the working capital available to Scientific Control," SCC said.

After 1970, SCC ran out of ink.

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## Cray Losses Expected

BLOOMINGTON, Minn. — The losses posted by Cray Research, Inc. in the third quarter and nine months were in line with expectations, according to the firm, which said it has incurred increased overhead for expanded production, marketing and installation activities.

Losses are expected to diminish during the fourth quarter as newly installed systems begin to produce revenues, the firm indicated.

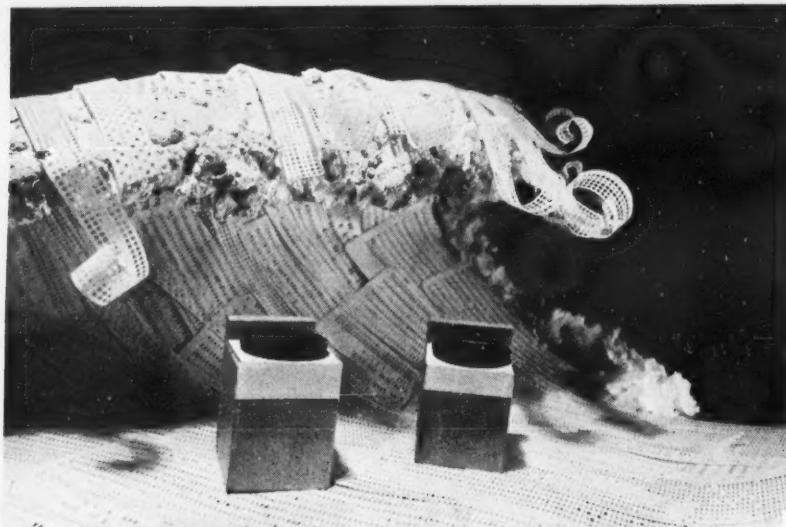
During the quarter, the firm reported revenues of \$533,761 com-

pared with none last year. The loss was \$867,379 or 61 cents a share compared with a loss of \$415,573 in the same period last year.

For the nine months, revenues totaled \$1.6 million compared with none and the loss was nearly \$1.99 million or \$1.41 a share compared with a loss of \$995,521 or 83 cents a share in the year-ago period.

During the third quarter, a Cray-1 system valued at over \$8 million was installed at the National Center for Atmospheric Research.

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## Data 100 Revenues Grow In Quarter, Nine Months

MINNEAPOLIS — Data 100 Corp.'s operating income in the third quarter and nine months rose compared with the year-ago periods.

Before extraordinary income, the quarter results showed \$823,000 compared with \$774,000 in the 1976 quarter while revenues grew to \$34.6 million compared with \$30.2 million.

Earnings, including a \$183,000 tax credit, totaled \$1 million or 20 cents a share compared with \$1.1 million or 28 cents a share in the same quarter last year, when there was a \$373,000 tax credit.

For the nine months, revenues grew to nearly \$97 million compared with \$87.9 million a year ago.

Operating income totaled \$3.1 million compared with \$2.7 million, but earnings were less because of a smaller tax credit.

During the nine months, Data 100 earned \$3.6 million or 76 cents a share, including a \$478,000 tax credit, compared with \$3.5 million or 88 cents a

share including an \$858,000 tax credit in the same period last year.

Revenues included nonrecourse sales to third-party lessors of \$4.2 million in the quarter compared with \$5.4 million in last year's quarter and \$13.1 million in the nine months compared with \$13.8 million for the 1976 period.

## Financial News

Total net shipments, including equipment sold to other manufacturers, reached \$28.5 million in sales value compared with \$22.9 million in the third quarter a year ago.

Net terminal shipments in the quarter reached \$23.2 million at retail sales value compared with \$20.1 million in the same period a year ago.

## Quarter Net Jumps at DEC

MAYNARD, Mass. — Digital Equipment Corp.'s first-quarter earnings grew to nearly \$26.4 million or 66 cents a share from \$16.7 million or 43 cents a share in the same period last year.

Revenues rose 48% to \$302.6 million from \$204.5 million in the same period last year. Equipment sales contributed almost \$238 million compared with the year-ago figure of \$160 million.

The company said the major build-

up in its manufacturing capacity, which had a positive influence on first-quarter performance, resulted in shortened delivery times to customers.

Despite the high level of expense associated with plant startups and the rapid integration of the new manufacturing facilities, productivity gains were achieved which were reflected in the earnings increase and improved profit margins over the comparable period a year ago, a spokesman said.

## Telex Quarter Results Soar

TULSA, Okla. — Telex Corp.'s second-quarter earnings soared compared with those of the year-ago period, totaling \$2.8 million or 26 cents a share compared with \$434,000 or 4 cents a share in the 1976 quarter.

The tax credits were \$1.5 million in this year's period compared with \$270,000 a year ago.

Revenues for the quarter ended Sept. 30 rose to nearly \$38 million compared

with \$22.8 million in the same period last year.

For the six months, revenues totaled \$70 million compared with \$47.4 million for the same half-year period last year.

Earnings were \$4.4 million or 41 cents a share, including \$2.5 million in tax credits, compared with \$1.6 million or 15 cents a share, including a \$709,000 tax credit, in the 1976 period.

## Nickels & Dimes

Wang will dispense quarterly dividends of 1 cent a share on common stock and 3-1/2 cents on share on class B common on Jan. 27 to holders of record Dec. 9.

\$ \$ \$

Computer Sciences Corp. shareholders approved repurchase of 1.5 million shares of its common from the Jones Foundation, an expense of about \$11.6 million.

\$ \$ \$

Applied Digital Data Systems, Inc. said it has bought 160,000 of its common shares from Richard Kaufman, a founder and vice-president, and from his family trusts.

\$ \$ \$

Pertec Computer Corp. began trading on the New York Stock Exchange under the symbol PCC.

Automatic Data Processing directors have okayed the firm's purchase of up to 75,000 shares of common for its employees' savings stock purchase plan. The purchases will be made from time to time.

\$ \$ \$

Technalysis, a computer consulting firm, is offering to purchase 45,000 of its common stock at \$4 per share until Nov. 30 in order to avoid SEC red tape by reducing its number of stockholders to less than 500.

\$ \$ \$

Sykes Datatronics' new banking agreement provides it with up to \$1.7 million in long-term funds. The firm called in the \$600,000 in convertible debentures which should eliminate the 25% dilution that would have occurred had the debentures been converted.

## Shipment Date Uncertain

# Diablo Still Working on Series 400 Drives

By Molly Upton  
CW Staff

HAYWARD, Calif. — Diablo Systems, Inc. is laboring over the birth of its 400 series of disk drives, which have yet to make an appearance.

The drives, ranging in size from 13.3M bytes to 53M bytes, were announced in 1975 and originally scheduled to be shipped in the first quarter of 1977. Shipment was later postponed to the last quarter [CW,

June 13].

It is now November, and Ridley Rhind, vice-president of marketing for the Xerox subsidiary, said in an interview recently that he was unable to give a projected date for the 400's shipment.

"We are heavily dependent on disk drives and are working hard on the 400," Rhind stated. "We're just not ready to ship it," he added.

The 400s are basically 3330-type

units and do not incorporate Winchester technology. Rhind said Diablo, a Xerox subsidiary, does not itself expect to venture into Winchester technology. "It would be inconsistent with our philosophy of removable packs," he said.

However, Xerox is about to acquire Shugart Associates, Inc., which makes floppy drives and has its own heads.

Diablo has converted nearly 100% of its customers of its 44A 10M-byte disk drive to the newer, lower cost version, the 44B, which included more options, Rhind said.

Conversion of customers "became a real challenge," he said, "because if you're going to provoke them to look at a new drive, they're going to look at other offerings as well."

"I'm very proud we haven't lost anyone," he said.

### Printer Shipments

Looking at printers, the other major aspect of Diablo's business, Rhind said the printer business is doubling each year. "It's a fantastic growth business," he indicated. The firm is shipping about 3,000 daisy wheel printers a month, he added.

In 1976, disks accounted for about 60% of Diablo's business, but that ratio has probably shifted to 30%, with printers climbing to 60% and small business systems to 5%.

However, Rhind indicated he does not see this as a trend. Next year the

firm's small business system, the 3200, marketed by General Business Systems, should represent about 15%, he indicated.

Previously, Diablo viewed printers and terminals as two separate product lines, but that has changed with the advent of microprocessors, he said. There is an 8080 in each unit.

Diablo uses 16K memory chips, and Rhind admitted it would be possible to insert up to 32K without much problem.

However, he said the firm has all the products it needs to support its very rapid growth rate, and the pressure is not for new products but to build and ship the models it has.

The firm offers models with daisy wheels printing at 45 char./sec in both plastic and metal, as well as a 200 char./sec 9 by 7 dot matrix print head that fits in the existing chassis, he said.

Basically, Diablo wanted to offer a range of speed and technology, although the matrix unit is admittedly higher priced than those units designed specifically for matrix printing, such as the ones from Digital Equipment Corp., he said.

Rhind said he thinks the prejudice against matrix printers resulted from the print quality of a 5 by 7 matrix. But Diablo's unit has a 9 by 7 matrix, so he expects it will gain acceptance, especially with its feature that allows it to operate at half speed, 100 char./sec, with high resolution.

## Executive Corner

WOODLAND HILLS, Calif. — Dataproducts Corp. has established a new position, executive vice-president, to whom various executives will report instead of to President Graham Tyson.

Robert G. Bartizal has been named executive vice-president of the firm's printer and memory business. All engineering, manufacturing, marketing and support functions for these activities will report to him.

### Other Moves

• Thomas A. Sherby, formerly senior vice-president of operations at Dataproducts Corp., has been named senior vice-president, systems and equipment group at Fairchild Camera & Instrument Corp. That group handles federal systems, industrial products, instrumentation system and video products.

• Michael G. Salter has been appointed director of OEM marketing for Raytheon Data Systems Co.

• J. Roy Henry was named vice-president, marketing of Burroughs Corp. Jack W. O'Leary was appointed general manager and group executive of the office products group, succeeding Henry.

• David C. Roberts has been promoted to director of the technical staff of Compusource Corp.

• Martin J. Chizzick has been appointed director of administration for the Field Operations Division of Storage Technology Corp.

• Dr. Joseph J. Sisco, President of American University of Washington, D.C., has been elected a director of Raytheon Co., Lexington, Mass.

• Joseph R. Leonardi has joined Per tec Computer Corp.'s Data Systems Operations Division as division vice-president, engineering.

• Joseph R. Creighton, head of the legal department of Harris Corp., has been elected vice-president of communication and information handling equipment. William LeMasters, the company's controller, was also named vice-president as was Robert E. Sullivan, the company's treasurer.

• Thomas D. Purtell has been promoted to director of marketing for disk products of Storage Technology Corp.

• Robert E. Reed has been appointed national marketing manager for the Computer Systems Division of Anderson Jacobson, Inc.

• Ronald L. McKinney has been promoted to vice-president of Cullinan Corp.

• H. Robert Blanding has been appointed director of engineering and John S. Connolly has been named

OEM sales manager of Cambridge Memories, Inc.

• John W. Kjos has been named director of marketing at Interscience Systems, Inc.

• Stan Pessok has been appointed to the newly created position of director of manufacturing at Shugart Associates.

• Kenneth Ritchin has been named director of facility planning for Medicus Systems Corp. and will be based in the company's Elmsford, N.Y. office.

• Dr. L. William Katz has been appointed a vice-president of Medicus Systems Corp.

• Tom Hinkelman has been appointed the first full-time executive director of the Semiconductor Industry Association.

• Don Kildebeck has been named to the position of director of manufacturing at Dataflux Corp.

• Gene Hnatek has been named to the newly created position of manager of sales and marketing support at Monolithic Memories, Inc.

• Richard D. Joyce has joined Harris Corp.'s Data Communications Division as vice-president of product development.

• Richard F. Mock has been named vice-president, federal systems operation of Univac's Worldwide Marketing & Services Organization. Dewaine L. Osman was appointed vice-president, eastern operations (U.S.).

• John F. Smith has been promoted to vice-president of manufacturing for Digital Equipment Corp.

• Thomas S. Benson has been elected to the position of vice-president, business development, a new position, at Electronics Memories & Magnetics Corp.

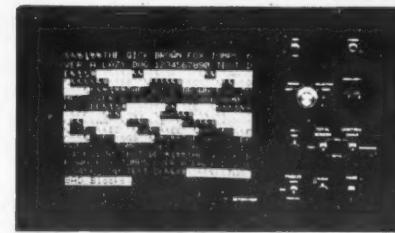
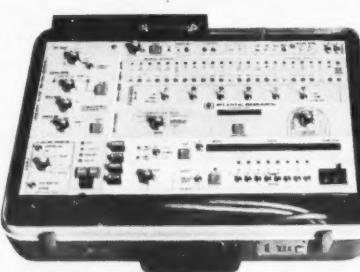
• James B. Duke has been appointed to the post of director of international marketing for NBI.

• Orren Y. Evans, president of TRES Computer Systems, Inc., has announced the election of several vice presidents to the new position of senior vice-president: Barnell Albers, customer systems and services; Bob D. Collins, construction and materials systems and services; Marvin D. Friedman, marketing; Robert O. Gaston, financial, employee and engineering systems and services; and Bill C. Sherwin, finance treasurer and secretary.

• Daniel Riordan has been appointed as European business manager of the business distributor product line at Digital Equipment Corp.

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# Probers Charge Mass. Backdated CDC Contract

By Tim Scannell

CW Staff

BOSTON — State officials here allegedly signed and then backdated a \$166,000 contract with Control Data Corp. for increased computer capabilities at the Registry of Motor Vehicles in direct violation of state law.

The alleged violation of law in connection with the state's merit rating auto insurance system was reported by station WBZ-TV after an investigation by its news department.

The merit rating plan passed by the state legislature is a system for setting insurance rates that penalize bad drivers with surcharges; the surcharges subsidize the rates of good drivers.

The contract was signed in late May and then backdated to March 31, when CDC employees actually began to upgrade the present CDC 3300 system software, according to the WBZ-TV investigators.

Frank M. Connolly, then acting director of the Merit Rating Board, told the investigators he was ordered to sign the contract on May 26. However, when a copy of the contract came back from the state comptroller's office, it was dated March 31. Connolly did not become acting director until that May.

When he questioned the discrepancy between the date that appeared on the contract and the date on which he had signed it, he said he was informed by the comptroller's office that it didn't

make any difference what date was stamped on the form.

## Other Signatures

Two other names were also signed on the backdated contract. One was that of Secretary of Public Safety Charles Barry, who said that such methods are not unusual in cases where a particular program has to be developed and operational by a certain date.

Barry contended that the board approved the contract and that CDC was working prior to the time the contract was formally assigned in order to meet an October-November deadline.

The other name signed on the contract was that of Secretary of Administration and Finance John Buckley. Buckley told the TV investigators

his concern as well as that of the Merit Rating Board, the Secretary of Public Safety and the governor's office was focused on implementation of the system improvements and the problem of getting the operation started.

On July 8, the Merit Rating Board met again to discuss the matter of CDC's work and the payment due the company. It was then that Daniel Jaffe, the assistant attorney general and the rating board member, questioned the legality of the contract.

Jaffe repeatedly warned the board the document had been in violation of state law since its inception, the TV station said.

According to Jaffe's version of what occurred at the July 8 meeting, he informed Peter Tropp, an aide to Gov. Michael S. Dukakis, that the contract was illegally backdated and that it would permit an unauthorized expenditure of Merit Rating Board funds.

However, Insurance Commissioner James M. Stone and newly appointed Registrar Alan Mackey voted at that meeting and at a subsequent meeting held on July 22 to begin paying CDC effective April 1 to avoid failure of the merit system. They stated that although the board recognized that a problem did exist, appropriate persons working in conjunction with the attorney general's office should recommend to the board a legal means for CDC to be paid.

The final result was a new contract dated Aug. 1. Although it resembled the old backdated document, its wording is slightly different and allows CDC to be paid for work it had started without official authorization.

## Supershorts

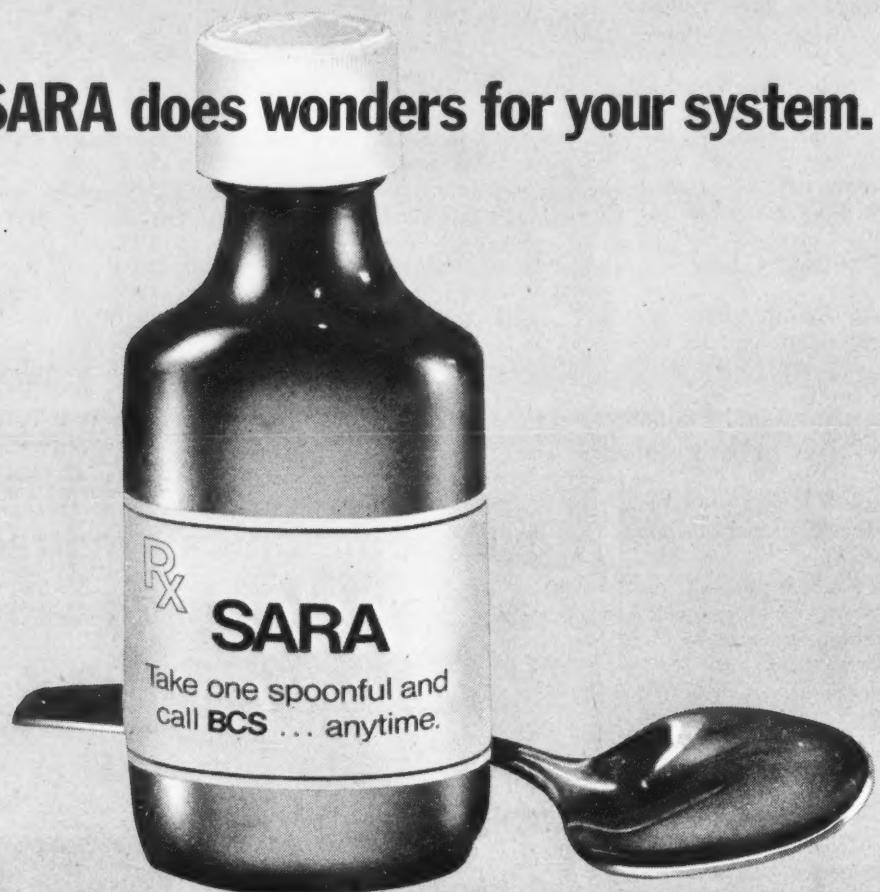
NCR Corp. will supply the Trans Canada Telephone System network interface machines for the Canadian Datapac network. Under the pact, NCR will provide data communications hardware and software for a processor which provides the Standard Network Access Protocol (Snap) link to the network.

Compuscan, Inc. has inked a pact with Equico Lessors, Inc., a subsidiary of the Equitable Life Assurance Society, under which Compuscan will offer users a variety of lease plans that will be financed by Equico. The agreement calls for up to \$15 million in lease financing over the next five years.

The Wharton School of the University of Pennsylvania will offer a course on "Foreign Market Entry Strategies" in four cities around the country next spring. Further information is available from Department 14NR, New York Management Center, 360 Lexington Ave., New York, N.Y. 10017.

In this country, Sycor has signed a \$24 million revolving credit agreement with its banks, which include the First National Bank of Boston, the Central National Bank of Cleveland, Citibank N.A., Chemical Bank, City National Bank of Detroit, Detroit Bank and Trust and Manufacturers National Bank of Detroit.

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SOFTWARE DESIGN	
PDP 10, 11, Micros, Cobol	25K

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You must be an innovator and be capable of complete project leadership for any number of the required systems. You will be responsible for requirements analysis, systems design, program specification, and launch of the specific micro/minicomputer and data base/communication solutions.

Please submit your qualifications so that we may discuss a challenging employment opportunity commensurate with your academic and practical background. Send resume to:



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Responsible for the specification, design and testing of telephone systems support software, network and control software, or maintenance and diagnostics software. Prefer a minimum of 3 years' experience in structured design, coding, testing and documentation of programs; development with large data base on multi-file computers and real-time systems, HIPO design documentation, TSO usage and software simulation techniques. Requires a BS or MS in Computer Science or Electrical Engineering and specialized study in the use of PL/1, Fortran, Assembler, Intel 8080 and PDP-11 programming languages.

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This position requires a minimum of 5 years' experience in the planning development, design and implementation of data base software, including data base management systems administration. Your primary responsibilities will be the development of data base system for a large on-going project including the implementation, support and administration of systems.

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Responsible for the analysis of teletraffic probability and queuing problems on digital and analog switching systems and the development of computer programs for switching systems. Perform control and route reliability studies, define and analyze problems for future systems features and their applications. Prefer a minimum of 3 years' experience in real-time control systems teletraffic problems, systems equipment quantities specification, and exposure to switching system specifications. Requires a BS or MS in Electrical Engineering, Computer Science or Math and a strong statistical background and experience in PL/1 or Fortran programming and model simulation.

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We have specific assignments available on project development teams responsible for the design implementation of various telecommunication processing systems utilizing minicomputers as the processing element. Responsibilities will include the development of software programs for real-time operating systems as well as unique hardware elements incorporated into the systems.

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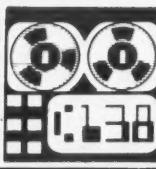
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We're looking for a dynamic self-starter to fill the position of Sr. Training Specialist. This position requires 3-5 years of EDP experience and 2-3 years experience in education and training. As the successful candidate you should know COBOL, Utilities, JCL, and various IBM operating systems enough to teach them in a technical environment. In addition, knowledge of IMS, MVS, SVS, and VSAM would be desirable. Some project leadership and systems analysis and design experience would be helpful.

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These projects are in support of our Space Tracking Data Network, Goddard Real-Time Systems and On/Off Site Projects with the NASA Goddard Space Flight Center.

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On Sunday, December 4 and December 11, you can talk about career opportunities at E-Systems, Garland Division, with a fellow professional by calling 800-527-5666. Or, to set up a face-to-face interview for Sunday, December 11, call the toll-free number now. If you cannot call these days, call toll-free 800-527-5666 any other time, day or night, at your convenience.

E-Systems is a fast-growing, \$320-million company involved in high technology electronic systems and in aircraft maintenance and modification.

We're located in Garland, Texas, a convenient suburb of Dallas. So, in addition to a challenging working environment, we can offer good schools, no state personal income tax, the lowest housing costs of the top ten major metropolitan areas, and year-round outdoor activities. We offer a unique combination of an exciting, challenging career opportunity and an excellent place to live. Currently, we're searching for:

**SOFTWARE ENGINEERS** We need good Software Engineers who can make contributions now or who are willing to be trained to our ongoing programs. If you are an EW/Surveillance Systems Engineer with a strong interest in software development.... or if you are a Software Engineering Expert experienced in the EW and Surveillance areas, opportunities for technical growth and a bright future may be yours at E-Systems, Garland Division.

You can take advantage of our formal IN-HOUSE TRAINING PROGRAM which will help you broaden your software skills while you are engaged in product development.

**RF ENGINEERS** BSEE, 2-10 year background in RF component design. Experience in microwave integrated circuits (MIC) design for use at P. S. C. X and Ku bands is required. Phase matched filters, switches, couplers, and power dividers are of primary interest.

**SENIOR RF ENGINEERS** BSEE, MSEE, 5-15 years background in broadband RF subsystem design. Experience in scanning superheat receiver techniques (P-band through Ku-band) including amplitude and phase tracking design, analysis of receiver sensitivity and dynamic range required. Experience in RF component design include microcircuit integrated circuits (MIC) is desirable.

**SYSTEM ANALYSTS** BSEE, MSEE, PhD, with 5 or more years

background in radar reconnaissance applications with emphasis in system design, simulation, and analysis. Experience should include system performance requirements analysis and using mathematical models and computational methods for system simulation and system performance evaluation.

**SYSTEM ENGINEERS** BSEE, MSEE, PhD with 2 or more years of background in radar reconnaissance applications with emphasis in system requirements analysis and system design and testing. Experience should either include: receiving and encoding preprocessing subsystems for coherent processing systems; or automatic self-test, systems interface requirements definition and automated computer controlled system testing.

**R & D ELECTRONIC TECHNICIANS** Must have 2 to 15 years background in microwave receiver systems, circuit design, breadboarding, or testing. Experience in RF, IF, video, digital techniques, or microcircuit electronics desired.

**ANTENNA ENGINEERS** BSEE or MSEE with 2 to 10 years background in broadband antenna design. Experience in log periodic element design, arrays, multibeam antenna systems and stripline techniques is required.

**ANTENNA TECHNICIANS** Must have 2 to 10 years background in antenna system breadboarding and testing. Experience with

modern amplitude and phase monitoring equipment is required.

**SENIOR PACKAGING SPECIALISTS** BSME, Senior Engineer with experience in advanced mechanical packaging techniques for airborne electronic subsystems including microwave, analog and digital circuits. Experience to include knowledge of applicable MIL-Specs, supervision of designers and draftsmen, packaging of microintegrated circuits and all producibility aspects of the design.

**SENIOR MECHANICAL DESIGN ENGINEERS** BSME with 5 or more years experience in the mechanical packaging design of electronic circuits. Experience to include the design of multi-layer printed wiring boards, dip brazing and castings.

**MECHANICAL DESIGN ENGINEERS** Requires 2 to 10 years experience in the mechanical design of printed circuitry, machined and sheet metal parts.

**SENIOR PROGRAM ADMINISTRATORS** BA, MBA or BS/MSEE with 2 to 10 years background in program administration or management. Duties require coordination and management of several programs relative to cost, schedule, and

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## PROJECT ADMINISTRATORS

Business or Engineering degree with 2 to 10 years experience in cost, scheduling, and project control techniques desired.

While you'll find that your salary at the Garland Division is equal to or higher than that offered by other electronic firms, salary is only part of our Total Compensation Concept. Scheduled merit reviews/increases assure that your salary will grow with your responsibilities and achievements. You will be evaluated regularly. In addition, you'll earn a generous retirement and have the opportunity to participate in E-System's unique Employee Stock Ownership Plan (ESOP).

Each December the E-Systems Board of Directors determines the ESOP stock allocation to all E-System employees. Common stock is placed in a trust in your name. There's no cost to you.

We will help you continue your college-university level education. We also offer a formal in-house software training program to help broaden your skills while engaged in product development. We offer in-plant training seminars, television education programs from ten universities for credit and noncredit hours, and management development programs.

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Computer Science  
Manager  
E-Systems  
Garland Division  
P. O. Box 6118  
Dallas, Texas 75222



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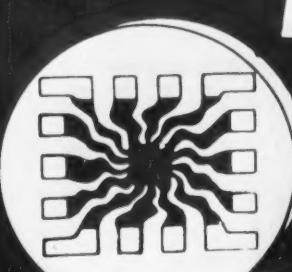
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# MICROPROCESSOR PROGRAMMERS/ ENGINEERS

## New Hardware & Software programs create more new opportunities with Burroughs ... in San Diego

These openings are a clear indication of the continuing rapid expansion of our Micro-Components Group — located in Rancho Bernardo, a desirable suburban section of San Diego.

We're now looking for creative professionals who can make key contributions to the design and development of a new highly advanced LSI Micro-Processor System. All positions offer fully commensurate salaries, outstanding benefits, including relocation assistance and the kind of long-range growth prospects you'd expect from a computer industry pacesetter like Burroughs. Openings are in the following areas:

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Will work on logic design of 1 or more of the LSI chips making up an advanced micro-computer system. Will interface with software and IC designers. Requires 3 or more years experience in computer systems design and degree in EE or Computer Science.

### COMPILER DEVELOPMENT

Will work with other programmers to develop high level language compiler. Requires BS degree in computer science or equivalent experience. Knowledge of PASCAL helpful.

### DIAGNOSTIC PROGRAMMING

Will work with logic designers to insure that micro-computer components are testable. Will design and implement diagnostic programs. Requires experience in testing of computer systems with emphasis on LSI components. Degree in EE or Computer Science desirable.

### TECHNICAL WRITING

Will be responsible for coordinating and editing all documentation for micro-computer project, including both hardware and software user manuals. Requires experience in the preparation of documentation for Engineering or Programming projects. Degree in EE or Computer Science desirable.

Interested candidates should submit a resume, including salary requirements to Mr. R. Valenti, Professional Placement, Burroughs Corporation, 16701 West Bernardo Drive, San Diego, California 92127.

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### PROGRAMMER/ANALYSTS

(OS, BAL or COBOL programming and design)

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positions require experienced FORTRAN programmers to develop on-line financial and property information systems. Extensive FORTRAN, data base and teleprocessing experience required. Prefer minicomputer and business data processing experience for this MODCOMP IV dual processor installation. Salary from \$18,886. Send resume to Boise City Personnel, Box 500, Boise, Id. 83702. Equal Opportunity Employer M/F.

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Unparalleled growth and expansion of our Fortune 500 Corporation, an established world leader in the computer industry, has created challenging career opportunities for experienced software instructors. Individuals selected will provide support for our customer software training programs.

### REAL TIME

Background should include experience in ASSEMBLER operations under a real time operating system preferably a PDP-11 operating under RSX-11.

These positions require solid language applications or operating systems level experience plus 1-2 years background as an instructor. 20%-25% travel required.

Qualified applicants are invited to send resume in confidence, or call (COLLECT) to: Linda Linder, (312) 640-5567, Digital Equipment Corporation, 5600 Apollo Drive, Rolling Meadows, Illinois 60008. We are an equal opportunity employer m/f.

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Experience must include:

- Problem definition, feasibility analysis, and economic justification.
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The individual we are seeking will have a combination of technical, business, and interpersonal skills, coupled with maturity and sound judgment. These skills should encompass:

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- An in-depth knowledge of the broad range of user disciplines found in an aerospace company.
- Familiarity with a broad range of hardware, software, and programming languages.
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- 2- Will function as a processor specialist with special programming assignments and data communications responsibilities.

Applicants must be thoroughly conversant with the 1100 Assembler, have a good general understanding of the Executive system, and be proficient in some higher level languages.

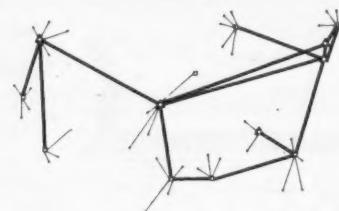
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CSC



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- Minicomputer Hardware/Software Design Tradeoffs
- Network Programmer/Analysts - PDP-11 (RSX-11D) H6000, Assembly language
- Message and Data Switching Systems Design

These entry through senior level positions require an Engineering or Science degree. Mixed BS, MS, and PhD's in Electrical Engineering and Computer Science preferred.

For prompt consideration, send resume and salary requirements to:

Lynn Hopewell  
Director of Network Engineering

## COMPUTER SCIENCES CORPORATION

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### Your assignments will include:

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You will interface with personnel in the Executive, Product Marketing, Software Development and Technical Education groups. Our environment is dynamic and provides opportunity for rapid advancement and career development. Your qualifications should include:

- Technical degree or equivalent
- 1-3 years' computer industry experience
- Proven success in sales or sales support

**INTERESTED??** Call Jon Zion collect at (617) 485-9174 or mail your resume or a detailed letter to his attention at Data General Corporation, Route 9, Southboro, MA 01772. Data General is an equal opportunity employer, M/F.

**Data General**

### Computer Programmer

The City of Roswell is accepting applications for the position of Computer Programmer. Responsibilities include programming and system management for new installation. Any combination of experience and training equal to four years of responsible experience in computer programming. Experience in programming in BASIC for DEC PDP 11/34 on RSTS E desired. Send resume and salary requirements to Wilson Conover, Assistant City Manager, P.O. Box 1838, Roswell, New Mexico 88201.

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To teach data processing in area of information systems and to participate in curriculum development for information systems major. Doctoral degree preferred. Will consider a candidate near completion of degree. Will receive applications until January 11, 1978, for opening August 1978. Equal Opportunity Employer. Contact Dr. O.R. Sutton, College of Business, Appalachian State University, Boone, North Carolina 28608.

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Outstanding opportunity for individuals with proven sales experience in the data processing industry.

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Two positions are available. The first is for an individual with a degree in Computer Science, or equivalent experience, to perform applications and systems level programming. Should be familiar with PASCAL, ALGOL-68, PL-1, PL/M or similar high level structured programming languages. Some knowledge of RT11, RSX11, runtime support packages and device handlers is required for this growth position.

We also seek an experienced applications programmer who has the ability to handle occasional assembler language problems. Must have 2-4 years mini-computer experience using FORTRAN, PASCAL, ALGOL, or ASSEMBLER language. Statistical analysis and data reduction experience is desirable, and experience with RT11 or RSX11 on PDP-11 or LSI-11 will be considered helpful.

Both programmers will be members of a project team employing a PDP-11/60 for development of an LSI-11 based distributed processing network. These openings require basic mathematical skills to the college algebra level. Prior experience in an educational environment would be an advantage in either of these career positions.

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This position is for the Senior Programming Professional who desires the challenge of working on multiple systems. Will assume responsibility for the ongoing development of a highly successful and innovative information retrieval system and its implementation and installation on a variety of new hardware and software systems. Systems currently include DEC System 10, 20 and RSTE-6B, HP 2000, 3000, Univac 1110, Cyber/72, IBM 370, Honeywell 66 Series, and microprocessors.

A strong working knowledge of BASIC, in its many varieties and of FORTRAN, and experience on a variety of systems is important.

### PROGRAMMING DOCUMENTATION

As an integral part of a software development team, you will be responsible for internal and end user documentation, including training support materials and applications manuals. Will work with Marketing in presentation of new applications, customer training and in-service workshops.

A minimum of two years experience in software or technical documentation is necessary. Experience in developing and conducting training programs is a definite plus. Experience in financial, student records or other educational applications is helpful.

Future job progression within TSC can lead to systems analysis, marketing, or editorial areas.

Time Share's Corporate Headquarters is located in beautiful Hanover, New Hampshire, home of Dartmouth College, amid other technical and development organizations. If you enjoy the sophistication of a college town, with the easy accessibility of Boston, and Montreal, you'll enjoy Time Share's location. Excellent skiing, hunting, fishing and other recreational facilities make this an outstanding area.

For an appointment, please send your resume along with salary requirements to: Whitney Moore, TIME SHARE CORPORATION, P.O. Box 683, Hanover, N.H. 03755.

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To assume responsibility for our proprietary data communications software and to participate in new product development. Experience with GA 16/65 and 440, time sharing operating systems and assembler language is desired.

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To participate in the implementation of proprietary hospital data management systems and the development of related new products. Experience in financial or commercial applications using ANS COBOL is required. Experience in hospital applications, on-line techniques and minicomputers would be a plus.

#### THE OPPORTUNITY

Is NOW . . . . . for consideration, please submit a resume including three references and salary history in confidence to:

Personnel Manager, DATX CORPORATION, Time & Life Building, 303 East Ohio Street, Chicago, Illinois 60611.

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Business Systems Design experience preferred. Required BS/MS in Computer Sciences. Engineer problem solving helpful.

Permanent position in desirable location.

Send resume and salary requirements in confidence to:

Space Research Corporation  
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SYSTEMS PROGRAMMER  
Mississippi State University Computing Center has a position on its systems programming staff for a highly motivated person with a minimum of a bachelor's degree and systems programming experience. UNIVAC 1100 experience highly desirable. Salary commensurate with experience. Excellent fringe benefits and opportunities for advancement.

Send resume to:  
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Div. of Numerical Services  
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The following openings have been created in the communications area:

**Manager of  
Communications Engineering**

Will be responsible for hardware/software of data communications group. Must have thorough understanding of applications of minicomputers and data communication systems with additional background in design of data communication hardware helpful.

**Digital  
Communications Engineers**

Both hardware and software specialists required. Should have a minimum of three years data communications experience.

**Communications  
Systems Programmers**

Minimum of six years in software development. Work requires a high degree of creative ability and programming skill as well as the ability to act as a project leader. Communications experience and advanced degree desired.

Computer Automation offers benefits surprising for a company our size such as: stock purchase plan, company sponsored Bachelor and Master degree programs, tennis court, volleyball and exercise room. Please indicate your specialty when replying. Address your resume and salary history to:



**Tom Soderquist**  
**ComputerAutomation**  
18551 Von Karman - Irvine, CA. 92713  
equal opportunity employer m/f

**DATA  
PROCESSING**

Major San Francisco based international marine transportation company is soliciting applicants to fill key positions in Data Processing organization.

**COMMON CARRIER SYSTEMS MANAGER**

This position will assume a major responsibility in the administration and management of the corporate data processing department in matters of applications systems throughout the corporation. Candidate will consider the applications staff, computer hardware and software and data as valuable resources to be evaluated effectively in filling the information requirements of the application system area. The position will manage those who have responsibility for specific systems and projects; it is, however, to facilitate large scale, geographically dispersed systems as well as small projects.

Successful candidates will have five to seven years' experience in Data Processing, three to five years' in Common Carrier Systems and three to five years' in Data Processing Management.

**APPLICATION SYSTEMS MANAGER**

This position plans, organizes and controls the activities of the Systems Analysis - Programming Section in the establishment and implementation of new or revised Financial Systems and programs concerned with electronic data processing. In full charge of all systems analysis and programming activities within Financial Systems area.

Successful candidate will have six to ten years' in Data Processing, four to six years' in Systems Analysis, and two to four years of experience in supervision.

**PROJECT LEADER**

Under general direction, has full technical knowledge of hardware, application, communication, systems design and programming techniques. Also has supervisory duties over contracting, coordinating and checking the work of contract systems analyst/programmers.

Here the successful candidate will have experience as a Project Leader for a minimum of two years, with three years in COBOL. Prefer Common Carrier Systems experience in maritime, trucking or rail; mini-computer knowledge would be helpful.

Excellent salaries, bonus programs, stock ownership and an all company paid benefit program, plus the opportunity to grow and have an impact, await the right person in all of our Data Processing positions. Send your resume in confidence to: MARINE DATA PROCESSING, subsidiary of CROWLEY MARITIME CORPORATION, ONE MARKET PLAZA, SUITE 3800, SAN FRANCISCO, CA 94105, Attn: L. Hellman. We are an equal opportunity employer, M/F.

**MARINE DATA PROCESSING**

subsidiary of CROWLEY MARITIME CORPORATION

**EDP/TC  
Training  
Specialist**

This challenging position provides an unusual opportunity to combine EDP and training knowledge to contribute to the growth and effectiveness of our national health care telecommunications system. Major responsibilities include development and instruction of EDP/TC related education training programs.

Requirements include at least 3-5 years data processing activity in telecommunications systems, plus 2 years classroom type training experience in business. Excellent oral and human relations skills are a must. A college degree and training program development experience are highly desirable.

We are headquartered in downtown Chicago and offer an excellent salary and outstanding company paid benefits. Send resume including salary history, in complete confidence, to:

Roberta M. Taillon  
Blue Cross Association  
500 N. Michigan Ave.  
Chicago, Ill. 60611

Equal Opportunity Employer M/F

**PROGRAMMER  
ANALYST**

ITT Gwaltney ... part of worldwide International Telephone and Telegraph Corporation ... is seeking an individual with a minimum of 2 years experience with Assembler, RPG11 and JCL on series 370 or 360 DOS VS - CICS/VS.

This position offers an excellent salary plus a full range of benefits including dental coverage and 100% tuition reimbursement. Gwaltney is located in an ideal setting for family living offering easy access to year-round recreational areas. Relocation expenses provided.

The successful candidate will have career potential within Gwaltney and the ITT organization. To apply, send resume including salary history to Employee Relations Manager.



**GWALTNEY INC.**

P.O. Box 489, Smithfield, VA. 23430

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## TERMINAL SYSTEMS DIVISION-DAYTON DAYTON, OHIO

Terminal Systems Division-Dayton is people — performance people — accepting challenges. Our Engineering Staff is a leader in the design and implementation of Financial Systems. The requirements of the systems business are constantly changing, providing unlimited opportunities for the creative individual.

Openings currently exist at all levels for individuals possessing a background in the following areas:

### PROGRAMMER/ SYSTEMS ANALYST

- Microprocessors
- Minicomputers
- Operating Systems
- Distributed Processing Networks
- Systems Simulation/SIMSCRIPT or GPSS
- Systems Constructors & Generators
- 8080 Assembly
- Assembly & COBOL Languages

Requires a BS/MS in CS, EE, or Math.

### PROGRAMMER/ ENGINEER

- Microcomputer Devices
- Semiconductor Technology
- Microprocessors, Memories & Logic Families
- Device Characterization Testing
- Computer Controller Test Equipment
- Test Program Development
- Data Analysis
- Communications Design

Requires BSEE with interests in hardware/software.

We welcome responses from new graduates as well as experienced personnel.

### SYSTEMS ENGINEERS

- Systems Design
- Hardware/Software Development
- Systems Architecture
- Microprocessor -Minicomputer Systems
- Distributed Processing Networks

Requires a BS/MS in EE, CS, or Math. 5 to 7 years experience preferred.

### COMMUNICATIONS DESIGN

- ISO Async
- Bi-Sync
- SDLC
- Microcomputers

Requires a BS in EE or CS. 3 or more years experience preferred.

We invite you to be a part of our future. Submit your resume and salary requirements to:

Employment Department, CW-1128  
Terminal Systems Division-Dayton  
NCR Corporation  
Dayton, Ohio 45479

# NCR

An Equal Opportunity Employer

## Manager Software Development (Telecommunications) San Francisco Peninsula

Do you have the background and desire to direct a team of Programmers? A challenging, highly visible opportunity exists for such a person to direct the development and support of software for telecommunications drivers, handlers, access methods, communications terminal emulators & network control programs for advanced intelligent terminal products.

Position requires a Manager with degree in Computer Engineering or Computer Science (advanced degree pref.) plus 5 years experience in original systems software development with major emphasis on telecommunications & internals. 2 years supervisory background also required.

If you're looking for an exceptional software environment, providing outstanding growth opportunities and excellent benefits in fast-paced financially sound expanding firm, send resume with salary history to C. Horn, Professional Employment (refer to 6700), FOUR-PHASE SYSTEMS, 10700 N. De Anza Blvd., Cupertino, CA. 95014. (408) 255-0900.

Equal employment opportunity is our pledge & practice. No agencies, please.



**Four-Phase Systems**  
Advanced technology for distributed processing

### INSURANCE SYSTEMS

**Education:**  
BS-Math, Computer Science, Business

**Software:**  
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**Applications:**  
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**Environment:**  
Life, Casualty, Variable Life

**Experience:**  
2 or more yrs. programming, design, consulting, installation, development, project management, systems programming.

#### Location Desired

New England, Middle Atlantic, Midwest, Southeast, Southwest

#### Salary Range:

\$16,000-\$30,000

If your resume could be prepared from the above, call or write Jack Edwards to explore your options. Jack's ONLY specialty is insurance data processing. He is a FLMI and has been in the business for 19 yrs.

*Jack Edwards Associates  
Suite 600  
8150 Leesburg Pike  
Vienna, Virginia 22180  
(703) 821-0688  
Insurance Personnel*

## DEC SYSTEMS PROGRAMMER Southern California

As a pioneering leader in advanced communications systems for commercial information processing, TRW Information Services is constantly looking for top professionals. We presently are seeking an individual to join our Communications Software Development staff. General responsibilities will be for teleprocessing software development and maintenance of DEC systems software on PDP 11-04 and -34 equipment. Develop/maintain a 2848 terminal controller system and 2780 tape-to-tape transmission system as well as prepare SYSGENS and provide in-house technical consulting.

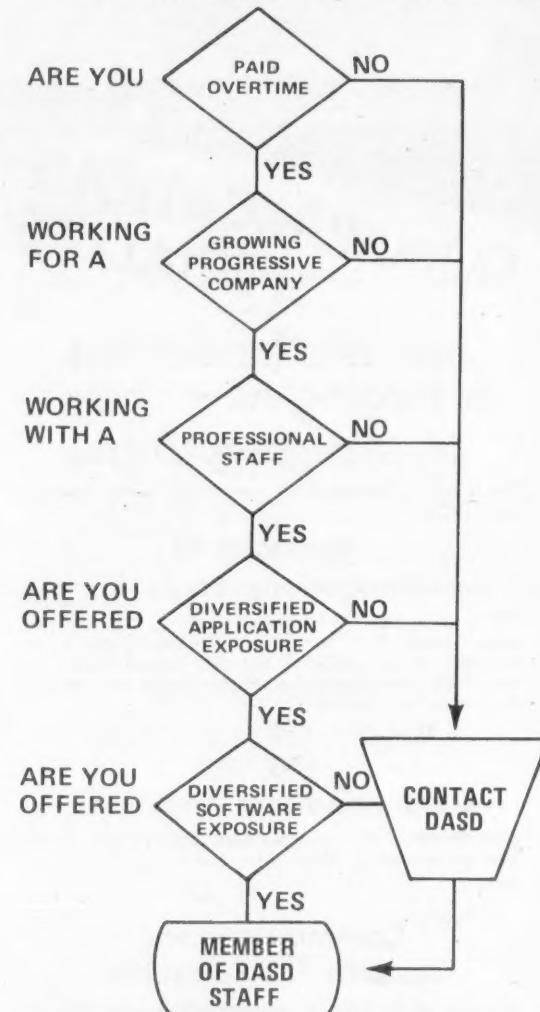
Requires minimum 2 years experience with DEC PDP 11 series CPU's, and knowledge of RSX 11-M or RSX 11S operating systems. MACRO 11 coding and communications software background, including synchronous and asynchronous protocols is desired.

TRW/ISD offers stability and challenge in a growing state-of-the-art environment. Salaries and benefits are exceptional. If you desire to work in an environment conducive to career development, please submit your resume with a synopsis of your earnings to Dept. HR.

**TRW** INFORMATION  
SERVICES  
1811 W. Katella Ave., Anaheim, CA. 92804  
(714) 776-6580

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## PROGRAMMERS PROGRAMMERS/ANALYSTS



DASD CORPORATION, a national consulting firm, is seeking to expand its staff with career oriented professionals who are looking for all of the above advantages.

Job openings in Los Angeles, Chicago, Houston, Philadelphia, Minneapolis, Des Moines and Milwaukee. Immediate future expansion plans will create openings in all other major metropolitan areas.

If you are ready to make a move that will broaden your experience and further your career, send your resume to DASD, the company that can help you.

**DASD**  
CONSULTING

**DASD CORPORATION**  
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## PROGRAMMER/ANALYST IMMEDIATE OPENING IN DENVER, CO.

On-line PARS base system, utilizing IBM 360/195, 4,000 remote CRT's and print devices. PARS application ACP Software base.

**REQUIREMENTS:** • Real time systems background (preference to PARS); • 2 years programmer/analyst applications experience.

Excellent benefits include free and reduced rate transportation. Salary - \$15,000 - \$21,000 yearly.

Send resume to:

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## DATA PROCESSING GROUP LEADER

To \$30,000

**THE COMPANY:**  
Major well known pharmaceutical manufacturer with excellent record of growth and service. Outstanding benefits package and paid relocation.

**THE POSITION:**  
The group leader will manage a section responsible for design, development and implementation of complex systems in the area of medical research including input and retrieval of information using state-of-the-art data base technology. This is an excellent position offering career advancement & professional growth. For details & interview information, send resume or call Fortune's MIS Division.

**ffORTUNE**  
Personnel Agency, Inc.  
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(212) 682-8600

## MANAGER SUPPORT SYSTEMS

Newly formed corporate MIS function of a large Chicago based Fortune 500 corporation has an excellent growth opportunity for an individual well seasoned in hardware/software planning. In an environment consisting of several large scale computers and many mini-computers this position will be responsible for shaping the future direction of hardware, software and data communications. As the function expands the individual will have management responsibility for key technical personnel. The successful candidate will possess a minimum of five years of experience in a large multiple mainframe MIS function in a hardware/software planning capacity. Experience in hardware/software planning should have been a primary responsibility of this individual's background and should be with a computer manufacturer, consulting organization or a large business enterprise. In addition this person should have extensive experience with distributed processing applications. We offer an excellent starting salary and benefits package along with the opportunity for career growth. This position reports to the Director of MIS. For consideration submit your resume and salary history to:

CW Box 3345  
797 Washington Street  
Newton, Mass. 02160  
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## IMS DISTRIBUTIVE PROCESSING

Amtrak is forming a nucleus of qualified IMS talent who will have the opportunity to grow into areas of leadership. We're expanding from IMS/VS DB to full IMS/VS DB/DC. Opportunity to get in on the ground floor. Distributive processing our goal. Resources available: 370/158, 3790, MVS and NCP/VTAM. IMS/VS DB/DC release 1.1.4 currently on order.

## IMS DATA BASE DESIGN SPECIALISTS

Responsibilities will include Data Base design, data dictionary maintenance, Data Base performance monitoring and tuning, and technical support.

The successful candidates will have extensive IMS/VS DB experience. Working exposure with the DC family. Knowledge of JCL and COBOL with MARK IV a plus.

## IMS SYSTEMS PROGRAMMERS

Responsibilities will include systems generation and maintenance, system performance monitoring and tuning, and error identification and debugging.

The successful candidates will have extensive IMS/VS DB/DC internals experience. Working exposure with MVS. Knowledge of NCP/VTAM, 3790, and/or SMP a plus.

We offer excellent salaries, benefits and growth opportunities. Send resume, including salary history in strict confidence to: J.R. Brune, Amtrak, 400 N. Capitol St. NW, Washington, D.C. 20001.

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## We can give you 3 good reasons to call Robert Half for data processing positions:

1. Robert Half has been in business for about 30 years. Can you name an EDP personnel service that's been around longer?
2. Robert Half specializes. We've been an integral part of the data processing community through all its generations.
3. Robert Half's offices are staffed by experts in the EDP field.

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55 offices. Robert Half is a network throughout the U.S., Canada and Great Britain. One call and you've searched the local market... or the world.

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Robert Half. Where integrity is a lot more than just HALF.

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## PROGRAMMER ANALYST PROJECT LEADER • SYSTEMS ANALYST

Move now with a fast-paced, expanding Fortune 100 company. Unlimited opportunity awaits you with this professional staff. Current environment includes IBM 370/158 operating OS/VS1. Background should include one or more of the following: MVS, CICS, JES2, TSO, IMS, COBOL or ALC. If you're a dedicated D.P. professional seeking challenge and advancement, longing to move into a State-of-the-Art shop, inquire now! Would you settle for less? Call or send resume in confidence to:

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## PROFESSIONAL SALES

### Business Consultant

If you have a record as an outstanding performer who can sell to senior executives of Fortune 500 companies and help them solve challenging business problems, TRATEC is looking for you.

As the leading company in the Training Industry, TRATEC sells business solutions to business problems. We have immediate openings for accomplished marketing representatives in the West, Midwest, and East.

For this position, you should be a self starter with a high degree of verbal fluency and conceptual ability. At least three years of proven sales success, preferably in the office equipment, computer, banking or financial services industries is required. Training and/or consulting experience would be helpful.

TRATEC is a progressive, growth oriented company and offers superior compensation for superior performance. For more information regarding this opportunity, send resume or letter of inquiry to Ms. Mary Jo Potter, Marketing Manager.

**Tratec**  
An Equal Opportunity Employer

Tratec Incorporated  
2040 Ave. of the Stars  
Los Angeles, CA 90067

## Data Entry Software Superstar.

Design software for  
intelligent terminals.

If you're a software designer for data entry systems, and you know you're good at it — really good — we want to talk to you.

We're looking for someone who has designed a solid data entry system previously, key-to-diskette or key-to-disk. Microprocessor experience, particularly with the M6800, is a plus.

We're a company that's growing like crazy in the computer terminals business. We're committed to building the most comprehensive line of terminals ever offered by a single manufacturer. We offer the excitement of a small company with the resources and great benefits of a large one.

The salary for this position is open. Call us now at (201) 366-5550, and tell us what you think you're worth. Ask for Barry Kelman, manager of software development.

**PERKIN ELMER | TERMINALS  
DATA SYSTEMS DIVISION**

Randolph Park West  
Route 10 and Emery Avenue  
Randolph, New Jersey 07801

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## PRIME OPPORTUNITIES

PRIME Computer, Inc. is emerging as a leading supplier of virtual memory computer systems in the Business Data Processing and Computational Time Sharing marketplaces with over 2,000 systems installed. The explosive growth in sales of our multi-user, multi-function computer systems has more than doubled our workforce in Sales, Systems, Field Engineering, and Hardware/Software Design. To meet our ever-expanding need for quality personnel, we are expanding our Employee Relations organization to include the following positions:

### REGIONAL EMPLOYEE RELATIONS REPRESENTATIVES

- Mountainside, New Jersey
- Oakbrook, Illinois
- Tarzana, California

Our Regional Headquarters will act as home base for these highly visible individuals who will be responsible for implementing PRIME's Employee Relations policies to our Field Marketing organization. These positions require heavy exposure to Field Recruiting in a Marketing and/or Field Service organization.

### SENIOR EMPLOYEE RELATION REPRESENTATIVE

- Framingham, Mass.

This individual will be responsible for all Employee Relations activities within our Engineering organization. Heavy emphasis is being placed on Technical Recruiting. The ideal candidates for these positions should have 3-5 years experience as a Personnel Generalist or Professional Recruiter. Company industry exposure a definite plus.

PRIME offers a competitive compensation program and dynamic opportunity for professional growth.

Send resumes to Jay Lyons

# PRIME

## PRIME COMPUTER, INC.

Prime Computer, Inc.  
40 Walnut Street  
Wellesley Hills, MA 02181

An Equal Opportunity Employer M/F

## CONSIDERING A CHANGE?

The time is right - EDP opportunities at all-time high!

### FEE PAID NATIONWIDE COVERAGE CONFIDENTIAL

Companies pay our fee, interviewing & relocation expenses. Client firms are engaged in all industries - Manufacturing, Banking, Retailing, Insurance, DP Services, etc.

Immediate needs include:

Prog/Anal (1-5 yrs)	\$15-22K	Soft. Prog (1-5 yrs)	\$18-24K
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Mgrs IBM S/3, RPG-11	\$16-22K	(mini's, PDP's, etc.)	

For more information, send your resume in confidence to:



Mark Fuller  
CADIL LAC ASSOCIATES, INC.  
32 W. Randolph St., Chicago, IL 60601  
(312) 346 9400

## PROGRAMMER/ANALYST

Challenging opportunity in our Research Programming Department to develop application systems in batch and on-line environments using DEC PDP-11/45 and IBM S/370. Application areas include support for biological scientists, statisticians, and laboratory automation. Minimum of 2 years programming experience including application systems design and a degree in Math, Statistics, or Engineering preferred. Knowledge of BASIC or FORTRAN required, PL/I or COBOL a plus.

If interested in pursuing this position, please send resume in confidence, including salary history to:

HAROLD F. McCULLOUGH, EMPLOYMENT MANAGER  
MERRELL NATIONAL LABORATORIES  
Division of Richardson-Merrell, Inc.  
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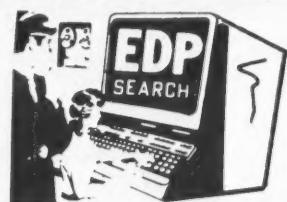


### COMPUTER SCIENCE ASSOCIATE EDUCATIONAL SPECIALIST

Provide support services, tutoring, notetaking, interpreting, academic advising and career guidance to deaf students. Coordinate research activities for identifying jobs available to deaf students. M.S. degree in Computer Science or equivalent educational experience. Minimum four years' experience in teaching/industry including use of timesharing terminals and graphic displays, XDS computer operations, programming and applications. Hardware and Software Systems Design and Analysis. Knowledge or willingness to learn manual communication. Please send your resume in strict confidence to:

Personnel Coordinator  
Dept. CW  
National Technical Institute  
For the Deaf  
One Lomb Memorial Dr.  
Rochester, N.Y. 14623

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Your file will be placed in our computer aided search system. When a position comes up in the area and discipline you desire it will automatically respond.

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(405) 525-8833

## PROGRAMMER ANALYST

Our dynamic, growth-oriented company is seeking a responsible, intelligent individual for the above position. Qualified candidates should have a minimum of 5 years' Data Processing experience with a solid background in Systems Design and COBOL Programming, knowledge of data base and teleprocessing. Structured programming and experience with IBM 370 series DOS hardware is preferred.

The successful candidate will interface with users, identify business problems, provide and implement solutions and document the system. Maintenance skills are required.

We offer competitive salaries and an excellent company-paid fringe benefit program. Please reply by resume to:

Trevor A. Morgan,  
Supervisor of Employment

**ACTION INDUSTRIES, INC.**  
CHESWICK, PA. 15024

AN EQUAL OPPORTUNITY EMPLOYER M/F

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### SYSTEM TEST ENGINEER

Honeywell's Los Angeles Development Center is seeking a system test engineer to lead and participate in the design and implementation of testing tools and measurement techniques for CP6.

3-5 years system analysis experience and knowledge of hardware monitoring and system testing measurement analysis is desired.

Send resume with salary history to:

Mr. Shei Klee  
HONEYWELL INFORMATION SYSTEMS  
5250 West Century Blvd.  
Los Angeles, CA 90045

**Honeywell**

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### INSTRUCTIONAL SYSTEM SALES

Computer Curriculum Corporation is expanding its sales force in several areas of the United States. Computer Curriculum Corporation (CCC) is the leading supplier of courses and systems for computer-assisted instruction. We seek those experienced in selling to educational institutions or government agencies. Compensation includes base salary, commission, company automobile, expenses, and a generous package of additional fringe benefits. Please respond by resume including recent earnings history to:

COMPUTER CURRICULUM CORPORATION  
P.O. Box 10080 - Palo Alto, CA 94303  
Attn: Vice-President, Marketing  
AN EQUAL OPPORTUNITY EMPLOYER

## PROGRAMMER/ANALYST

Monsanto Research Corporation, a subsidiary of Monsanto Company, has an excellent career opportunity for a results oriented individual to become a member of a centralized computer applications group. Responsibilities will include the development of new applications and the modification, conversion, and improvement of existing computer systems. The individual selected will consult with operating departments to analyze business and scientific problems and implement recommended solutions.

Successful candidate should have B.S. or M.S. in Computer Science with minor in business. Minimum of 5 years experience in high level language - Fortran, Cobol, etc. on IBM 360/370. Familiarity with IMS Data Base applications involving real time is desirable. U.S. citizenship required.

Attractive salary commensurate with qualifications plus an excellent benefits program.

Please send resume and salary requirements to:

Mr. C.N. Johnson  
Monsanto Research Corporation  
Mound Facility, P.O. Box 32  
Miamisburg, Ohio 45342  
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- MGR CONSULTING (MFG, FIN) to \$35,000
- CONSULTANT (MBA) to \$30,000
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- O.R. ANALYST (MFG, FIN) to \$28,000
- PROGRAMMER (VS INT) to \$25,000

These represent but a few of many outstanding openings we are currently handling in the N.Y. metropolitan area, and other parts of the country. Call us now or mail in your resume. If you are not seriously looking at present but would like to be kept in mind if a specific position materializes, call or write and ask about our "contact" service. All replies will be held in the strictest confidence.

**PARK-SLOAN ASSOCIATES, INC.**  
Personnel Consultants

98 Cutler Mill Road, Suite 277  
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**COMPUTER PROFESSIONAL**

The University of Delaware is seeking candidates for an opening in the area of instructional data processing.

**Senior Programmer Analyst,  
Instructional Services**

Responsible for providing consultation and assistance to faculty and student users in general data processing and statistical analysis. Minimum qualifications require equivalent of bachelor's degree with 3 to 4 years effective experience or equivalent of master's degree with 2 to 3 years effective experience, with at least 2 years at the level of Instructional/Research Services programmer analyst level. Degree work should have included courses in information processing.

This position represents an opportunity to work within a centralized university computing center on a large scale Burroughs 7700 system, a Digital Equipment PDP-10, PDP-11/70, and Hewlett Packard 2000 Access System.

Submit resumes including salary requirements by December 5, 1977 to: Computer Center, University of Delaware, Newark, DE 19711. An Equal Opportunity/Affirmative Action Employer.

\*\*\*\*\*  
data processing

**PROGRAMMERS**

Key Positions with Our Winning Computer Consulting Team in Springfield, IL., Indianapolis and Chicago.

If you're skilled in COBOL, ALC and/or PL-1 and have at least a 2 year success record of accomplishment with large scale IBM systems under IMS... we have the programming and system challenges to match your expertise. These positions require high productivity.

As a member of our professional staff, you'll be rewarded with an excellent salary and benefits. For details call Don Breitfelder collect, from 10AM to 5PM at (312) 786-0220.

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300 South Wacker Drive  
Chicago, IL. 60606  
since 1966

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**PROGRAMMER/  
ANALYSTS**
**OPENINGS AT ALL LEVELS  
(Minimum 1 Year Experience)**

Keystone has a number of openings in our modern, suburban facility for qualified talented people with programming and systems experience. Typical activities at Keystone include software development in the areas of operating systems, compilers management information systems, on-line systems and process control work. Keystone offers qualified programmers the opportunity to work on a variety of minicomputers (PDP-11, BC/7, SEL, Hewlett-Packard, Data General, General Automation) as well as large scale systems (IBM 370, CDC 6600).

**MINI/MICRO PROGRAMMERS**

Requires experience using Assembly language, Fortran and/or PLM working on data base management, communications, factory automation or process control. Additional openings exist for personnel with ASW, Acoustic Processing and Navy Weapons systems experience.

**IBM/370 PROGRAMMERS**

Requires experience on IBM/370 using COBOL/ALC working with DL1 in an IMS or CICS environment.

**BUSINESS APPLICATION  
PROGRAMMER/ANALYST**

Duties will include design and implementation of business systems using RPG II, COBOL or BASIC. Experience in order entry, inventory control and sale analysis is desirable.

For your interview, please call or send resume (including current salary) to Mr. James J. Frock, Vice President.



**KEYSTONE COMPUTER ASSOCIATES, INC.**  
1055 Virginia Drive, Fort Washington, Pa. 19034  
(215) 643-3800

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**COMPUTER SCIENCE  
CAREER/GROWTH OPPORTUNITY  
CORPORATE HEADQUARTERS STAFF**
**SYSTEMS DEVELOPMENT  
ANALYSTS AND ENGINEERS**
**QUALIFICATIONS:**

- \* Bachelor's or masters degree in computer science engineering, mathematics, physics, accounting or business.
- \* Two or more years experience developing computer based systems
- \* Ability to identify business problems and develop solutions through use of on-line, distributed, or batch processing systems.

**RESPONSIBILITIES:**

- \* Development of marketing, manufacturing, logistics, engineering, accounting and administrative systems for a major worldwide corporation consisting of a petroleum company, chemical company, coal company and construction company. Development includes feasibility studies, analysis design programming, testing and installation of systems on hardware, configurations ranging from minis to 370/168.

**SYSTEMS PROGRAMMERS**

- \* 1 year recent ETAM/TCAM experience required. Commercial programming and TL1 or on-line INTERCOM/IMS/CICS desirable.
- \* BS degree in math or computer science essential.

**RESPONSIBILITIES:**

- \* Perform systems programming duties in support of OS/VS2 and IMS/VS/DB/DC systems.
- \* Systems generation, maintenance assurance testing; tuning including assist and development and implementation of teleprocessing networks.
- \* Design and develop administrative and management reporting dealing with the teleprocessing systems.

These positions are available in our corporate headquarters in Ashland, KY. Excellent compensation program including: attractive salary and extensive benefits. For immediate consideration please send resume and salary history in confidence to:



Diane Aldridge  
Dept. K

**ASHLAND OIL CO.**  
P.O. Box 391  
Ashland, KY 41101  
An Equal Opportunity Employer M/F

**DATA PROCESSING  
OPERATIONS**

Sea-Land Service, a pioneer and world leader in the field of containerized transportation, has the following growth-oriented positions available on our NIGHT SHIFT in our Elizabeth, New Jersey Information Systems Department:

**TECHNICAL SUPPORT ANALYST**

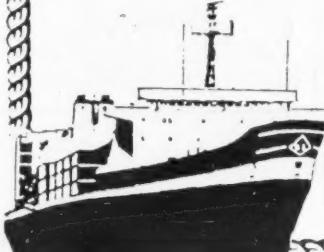
Interface with development and systems support personnel on implementation of new systems and job acceptance, taking responsibility for operations, and such functions as cataloging, JCL system failure reports, etc. Requires 2 years tech support experience in large scale 370 OS/VS environment; knowledge OS utilities, JCL, assembler; familiarity with writing and acceptance of standards and procedures. Some supervisory experience in OS/VS TP operation helpful.

**COMPUTER OPERATIONS SUPERVISOR**

Be responsible for daily execution of jobs run at Computer Center and for documenting/resolving system failure. Requires 2 years supervisory experience combined with 2-3 years prior operations background in 370 OS/VS TP environment.

In addition, knowledge of TCAM, CICS, MVS is also desirable for both positions.

Sea-Land offers fully competitive salaries plus excellent company-paid benefits package. Send resume or letter detailing background including salary history in confidence:



**BETTE WALSH, EMPLOYMENT MANAGER**  
**SEA-LAND SERVICE, INC.**

P.O. Box 900,  
Edison, New Jersey 08817  
An Equal Opportunity Employer M/F

**CICS**
**PROJECT LEADER**

**\$20,000-\$24,000**

Bruce A. Montville

**Exeter Associates**

Executive Recruiters  
P.O. Box 623, Computer Park  
Hampton, N.H. 03842  
(603) 926-6712

**SR. PROGRAMMER/  
ANALYSTS**

Conn. corp. expanding development staff. Individuals with COBOL and IBM/OS bkgnd. qualify for multiple openings. Salary to \$22,000 (Fee Paid). Contact Stan Durbas.

**ROBERT HALF**  
PERSONNEL AGENCIES

111 Pearl St.  
Hartford, Conn. 06103  
(203) 278-7170

**EDP Professionals**

- Programmer Analysts \$14-24K
- Systems Analysts \$18-27K
- Project Leaders \$22-29K
- Project Managers \$26-35K
- Internal Consultants \$24-33K
- Management Consultants \$22-32K

Our clients have needs in all of the above areas in large-scale & mini computer environments. For information on career opportunities, please phone or write the appropriate office.

**the jarvis walker group**

N.Y.  
N.J.  
CALIF.

535-5th Avenue, NYC 10017  
(212) 867-2650  
349 E. Northfield Rd, Lincoln 07039  
(201) 994-3773  
11222 La Cienega Blvd, Inglewood 90304  
(213) 670-7353

## position announcements

**PROGRAMMER ANALYST**

Maintain Data Processing Services Company offers opportunity to qualified Programmer/Analyst candidates - wide variety of applications and hardware - State of the Art Software in a professional environment - planned professional growth - competitive salary and benefits plan - positions available in our Baltimore, Buffalo, Rochester, and Syracuse locations. Call (412) 391-8962 or rush resume.

Computer Task Group, Inc.  
Chamber of Commerce Bldg.  
411 Seventh Ave.  
Pittsburgh, PA 15219  
Equal Opportunity Employer M/F

**MANAGER DATA PROCESSING**

Progressive multi-plant company located in growing upper midwest city needs an experienced data processing manager. Ideal candidate will have an under graduate degree, up to 5 years data processing management experience and growth potential. Salary in mid to upper \$20's, attractive fringe benefit package. Send resume and current salary information to:

Personnel & Industrial Relations Department  
American Crystal Sugar Co.  
101 North Third St.  
Moorhead, Minn. 56500  
Equal Opportunity Employer

**Manufacturing Control Systems**

Are you a Data Processing Professional tired of hearing talk about the need for "Management Commitment" to systems development?

Our corporate management is committed to the long term development of computer supported systems. With their support we are developing effective people-oriented systems in a Data Base-Data Communication environment.

We are in the early phases of installation of an integrated manufacturing control system for the first of our eight manufacturing divisions. We recognize that our system will only be as good as the people who design and implement it.

We are seeking creative business-oriented individuals who have experience in Systems, Programming, and Project Management. We need "a few good people" to accomplish our goals.

Please submit a letter or resume including current salary in complete confidence.

**WEHR CORPORATION**

Nancy Saeger  
Wehr Corporation  
10201 W. Lincoln Ave.  
Milwaukee, WI 53227

**Data Terminal SALES**

If your career path is in Sales, this is a unique growth opportunity for aggressive, enthusiastic Data Processing or Communications professionals. We are a full line computer terminal company breaking away from the pack with an exciting new product. A sophisticated micro-processor based flexible disk controller with an untapped, wide open marketplace. Full management and technical support. The most advanced field service capability in the business.

Excellent compensation through salary and commission. To explore this sales opportunity, call Mr. Hansen, Toll Free

800-631-7050 Ext. 423  
or write to Personnel  
**data services**  
western union

70 McKee Drive  
Mahwah, N.J. 07430  
Equal Opportunity Employer M/F

**SYCOR****MANAGER  
USER LANGUAGES  
SOFTWARE DEVELOPMENT**

Continued expansion in User Programming facilities for Sycor systems has created a management position in User Languages. This is a career position with high corporate visibility and requires an assertive individual who is capable of managing software professionals engaged in language development and compiler implementation.

The position requires a broad background in Software Engineering. Particular skills requirements include structured programming techniques; use of higher level languages for systems implementation; knowledge of one or more compilers; table-driven parsers; design of interpretive machines; microprocessor-based systems. Supervisory experience at the project team level or above is required. Advanced degree in Computer Science preferred.

We offer a competitive range of salaries, comprehensive benefits and highly-visible opportunities for future growth. To arrange an interview, send your resume to:



Corporate Employment & Staffing  
**SYCOR, INC.**  
100 Phoenix Drive  
Ann Arbor, Michigan 48104  
1-800-521-3176

**"Sycor Puts Computer Power Where the Work is"**

**SYCOR****PROGRAMMER/ANALYST (Re-opened)**

Our Programmer/Analyst - Educational Systems manages PDP/11 RSTS/E time-sharing system, plans and conducts programming courses in BASIC-PLUS and other languages, supervises student Programmer/Consultants and designs instructional and research software. Requires bachelor's degree, proficiency in one high-level and one assembly language, and experience in interactive instructional computing as programmer or programmer/analyst. Good benefits with salary based on qualifications. Submit resume, salary expectations, date available and names of three references to: Mr. R. Whitcomb, Personnel Director, P.O. Box 599, Appleton, Wisconsin 54911, by December 9. LAWRENCE UNIVERSITY, An equal opportunity employer.

**FACULTY POSITION**

at Northeastern University starting January 1, 1978. Assistant or Associate Professor. To teach computer languages and applications and assist in development of computer-science curriculum. Ph.D. in computer science preferred. Write: Prof. R. Poe, Dept. of Graphic Science, 360 Huntington Ave., Boston, MA 02115; or call: (617) 437-3634.

**COMPUTER POSITIONS**

Eastern Michigan University is accepting applications for the following positions:

**Manager, Operation Services**

Responsible for overseeing the efficient operation of computing equipment and facilities for all areas of the University. A Bachelor's degree in computer science or a related field or the equivalent combination of education and experience and one to three years experience in computer operations is necessary. A Master's degree and experience with IBM or DEC equipment are desirable.

**Manager, Technical User Services**

Will provide for the technical applications flexibility of current hardware, the installation of new equipment, and the communications and explanation of services to users. A Bachelor's degree in computer science or related field or the equivalent combination of education and experience and three to five years as a software or hardware specialist are necessary. A Master's degree and experience in generating and maintaining an operating system are desirable.

Deadline: January 15, 1978. To request employment application, contact:

**Eastern Michigan University**  
Personnel Office  
112 CW Welch Hall  
Ypsilanti, MI 48197  
Affirmative Action/  
Equal Opportunity Employer and Educational Institution

**Data Base Analyst****SALARY TO \$1,793 MO**

Include the design of IMS data bases; generation of DBO, PSB and MFS control blocks to support applications needs.

Equal to college grad and 4 yrs. exp. in systems analysis including 2 yrs. in designing IMS data bases and providing technical support in the development of IMS DB/DC systems.

Examination consists of interview which may be done by phone.

**CITY OF SAN DIEGO PERSONNEL**

202 C St.  
San Diego, CA 92101  
(714) 236-5753

Equal Opportunity Employer M/F

**BLOOMSBURG STATE COLLEGE:****Teaching position**

open beginning in January, 1978 and/or September, 1978 in Computer and Information Processing. Qualifications: graduate degree (earned doctorate preferred) in computer field with experience in commercial/financial applications, or graduate degree (earned doctorate preferred) in business field with experience in computer applications. Teaching experience desired. Salary commensurate with experience and background (\$13,000 to \$26,000). Contact Dr. Norman L. Hilgar, Chairperson, Department of Business Administration, Bloomsburg State College, Bloomsburg, PA 17815 by January 16, 1978. Position is contingent on budgetary allocations and appropriations. An Affirmative Action, Equal Opportunity Employer.

**SOFTWARE PROGRAMMER/ANALYSTS**

S O F T S E A R C H S Y L A N A  
E I N O T Y A D L N O S V I L N  
P N N I V D L Y S G A T B M N A  
P T S E A R C H T I V L E T O L  
R E M R T S C C H S L L Y S R Y  
O R C A M E A R C E G G G A S C S  
G A A W E V R E M D I P I R T S  
R C R T T M E T S Y S R N E A S  
A T O F S Y S R Y G E O T T M A  
M I O O N L I E S R D G E R G S  
M V R S A M B I E A T R R E I S  
B E A L I V E V S M V A A I S E  
R V N G E T O A S S E M B L E R  
I V B I B N I L N O I B L V D M

We're looking for PROGRAMMER/ANALYSTS to work on the world's largest and most advanced full text ONLINE SEARCH and RETRIEVAL SYSTEM.

DAYTON team positions require three years programming experience, (familiarity with MACRO ASSEMBLER helpful) and the ability to verbalize solutions and prepare written reports on system/project requirements.

Call us collect and find out what we're all about.\*



(513) 278-4861

Joanne Peterson

automation consultants, inc.

1700 needmore road, dayton, ohio 45414

\*Capitalized words can be found in puzzle

An Equal Opportunity Employer M/F

**IMS PROGRAMMER****System Analyst**

Two years experience developing COBOL systems and two years experience with FORTRAN preferably in higher education. Statistical application and experience at the college level. A knowledge of SPSS and BASIC is desirable.

**Programmer**

Knowledge of an ability to effectively apply various computer languages, emphasis on COBOL and FORTRAN. B.S. in Math, Statistics, or Computer Science; or A.S. in Computer Technology; or two years of programming experience in COBOL and FORTRAN. Knowledge of BASIC helpful.

Send resume to Wilson Rourk, Personnel Manager, Austin Peay State University, Clarksville, TN 37040.

EEO/AA

**PROGRAMMER/ANALYST**

We have immediate openings for two programmer/analysts with a minimum of two years experience in BAL or COBOL. Experience in CICS or DL1 coding desired but not required. Responsibilities include programming, testing, and implementing various batch and on-line applications.

Figli's is a medium size company located in Central Wisconsin. Most applications on our IBM 370/148 are order entry and mailing list oriented. This is an excellent opportunity with a profitable and progressive organization.

Send complete resume and salary requirements to:

Greg O'Reilly, Figli's Data Center, Inc., Central Plaza, Marshfield, Wis. 54449.

**Systems Analysts/Programmers****Pacific Northwest**

Immediate opening in Olympia, Washington for analysts/programmers with UNIVAC 1100 series computer experience; to design and code applications systems or operating systems/software for UNIVAC 1100 computer system including interactive teleprocessing using DMS-1100 and TIP.

Requires bachelor degree in computer science or related field (or completion of two year vocational training course in data processing) and experience in one or more of the following: Systems Analysis, Design, Computer Programming, Software Programming, or Installation of Computer Applications Systems. Applicable experience can be substituted for education.

Salary, depending on qualifications, \$13,500 to \$24,000. Employer paid medical, dental, LTD, life insurance, liberal holiday, vacation, sick leave policies.

Send resume indicating UNIVAC 1100 experience with salary history to:

CW Box 3336  
797 Washington St.  
Newton, Mass. 02160

**WANTED**

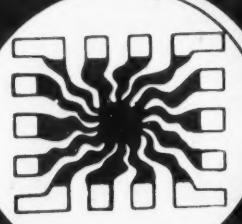
Director of Systems and Programming. IBM System 370 OS/DOS ANS Cobol. Senior Programmer with supervisory experience will be considered.

**PROGRAMMER**

IBM Model 370 DOS/VS experienced with Program Libraries. Call or mail Resume to:

Radiator Specialty Company  
P. O. Box 10628  
Charlotte, N.C. 28237  
1-704/377-6555

position announcements	position announcements	position announcements	position announcements	position announcements
<b>ASSISTANT DIRECTOR ADMINISTRATIVE DATA PROCESSING</b>		<b>OVERSEAS ASSIGNMENT DATA PROCESSING MANAGER</b> We are a worldwide leader in the marine engineering and construction industry offering a challenging managerial position in Dubai United Arab Emirates. Bachelor degree preferably in accounting or computer science and 6 years experience with project management responsibility in a variety of application area including accounting and finance. Should be familiar with DOS/VS operating system in an on-line environment, IE 1 135/138, teleprocessing and Cobol. Position offers excellent salary, family status, overseas premium and fringe benefits package. Please submit resume, including salary history, in confidence to: W.J. Buckley, OCEANIC CONTRACTORS, INC. Subsidiary of J. McDermott & Co., Inc., P.O. Box 61961 New Orleans, LA 70161 Equal Opportunity Employer M/F	<b>DATA PROCESSING PROFESSIONALS</b> Recent expansion has created new opportunities for data processing professionals: <b>Financial/Commercial Applications</b> * Software support position to assist systems programming in on-line assembler, teleprocessing applications: software for maintenance and batch processing for on-line files. Excellent growth opportunity for one with strong ALC to develop in the systems area. * Programmer analyst position for the professional well versed in user interface and with 2-4 years experience. * Programming positions for Cobol professionals with 2-4 years experience. Computer resource is an IBM 360/50, DOS, central processing unit. <b>Technical/Scientific Applications</b> * Supervisor position calling for 5 years experience in data management or large data base applications. Will participate in the development of interactive retrieval and updating systems for large medical data base. Computer resource is a CDC Cyber 172 under Nos 1-2. Direct replies to Leslie Clem, (713) 792-2240, or apply personnel department, The University of Texas System Cancer Center, M.D. Anderson Hospital and Tumor Institute, 6723 Bertner Avenue, Suite 112, An Equal Opportunity/Affirmative Action Employer.	
<b>BOSTON UNIVERSITY</b> 881 Commonwealth Ave., Boston MA 02215 An Equal Opportunity Employer		<b>FIELD SERVICE</b> SYSTEMS 370/360, H-200, XDS, Univac, CDC All Large & Medium CPU's MINI's PDP, NOVA, G.A., HP, etc. All Mini Systems I/O STC, TELEX, CDC, ITEL, CALCOMP, etc. All Peripheral Experience <b>MTTR</b> (312) 547-6682 <b>MTTR ASSOCIATES</b> 1107 Mannheim Road \$12-30K Westchester, Ill. 60153 Field Service Specialist Nationwide Placement Private Employment Agency No Fees To Applicants	<b>PROGRAMMER ANALYST I</b> \$1415 / a month to start These positions require: two years experience in computer programming utilizing COBOL or Basic Assembler Language within the last 3 years, for medium-to-large scale third generation computers. This experience should have been in the use of structured design and programming methods such as HIPO, top down development, structured programming, walk thrus, and program design languages. These professional assignments offer career stability and excellent employee benefits. Please apply to:	<b>PROGRAMMER ANALYST I</b> \$1415 / a month to start These positions require: two years experience in computer programming utilizing COBOL or Basic Assembler Language within the last 3 years, for medium-to-large scale third generation computers. This experience should have been in the use of structured design and programming methods such as HIPO, top down development, structured programming, walk thrus, and program design languages. These professional assignments offer career stability and excellent employee benefits. Please apply to:
<b>ATTENTION!!!</b> <b>PERPLEXED PROGRAMMERS ANGUISHED ANALYSTS DEFEATED DESIGNERS</b> If you are frustrated in your present position and are looking for a unique change, consider the challenging career path in software documentation. Utilize your current systems background and latent talents in software documentation within an environment of creativity, challenge and reward. Cincom Systems, Inc. the leader in the software industry, is currently seeking individuals to fill software writing positions in their communications support services department. If you are interested in discussing a possible future with an industry leader, send your resume to: Mr. Phil Elam, 2300 Montana Avenue, Cincinnati, Ohio 45211. <b>Cincom Systems, Inc.</b> 2300 MONTANA AVENUE CINCINNATI, OHIO 45211 EQUAL OPPORTUNITY EMPLOYER		<b>EDP MANAGERS</b> We are recruiting for three prominent Phila. area firms seeking aggressive, stand-alone EDP MANAGERS w/proven track records & the conceptual ability & initiative to organize & direct department tasks. <b>CENTER CITY</b> To \$24K MFGR-COBOL bkdg w/HUN-EVWELL prfd. Co has H6240 MONTGO CNTY To \$20K MUST come from BANKING environ. 370/COBOL. <b>BUCKS CNTY</b> To \$17K MFGR-MINI w/BASIC nec. For confidential attention, please send resume to: <b>ROBERT HALF</b> PERSONNEL AGENCIES 2 Penn Center, Suite 706 Philadelphia, PA 19102 (215) 568-4580	<b>STAFF MANAGER</b> <b>Data Processing Services Planning</b> Saudi Arabian airlines offers excellent opportunity to an aggressive professional with a BS degree and at least 4 years of Data Processing experience. As Staff Manager, the selected candidate will interface with all departments and obtain information pertaining to future data services needs. Responsibilities will also include assisting in the justification and design of computer based systems that meet these needs reviewing future applications requirements; and recommending the upgrading of equipment or purchase of new equipment. We offer a minimum two year contract including benefits such as excellent compensation with overseas allowance, company paid housing and utilities, family relocation overseas, health and life insurance, and school through the 9th grade. Those who qualify as overseas residents are eligible for limited income exclusion under or Canadian citizenship required.	<b>STAFF MANAGER</b> <b>Data Processing Services Planning</b> Saudi Arabian airlines offers excellent opportunity to an aggressive professional with a BS degree and at least 4 years of Data Processing experience. As Staff Manager, the selected candidate will interface with all departments and obtain information pertaining to future data services needs. Responsibilities will also include assisting in the justification and design of computer based systems that meet these needs reviewing future applications requirements; and recommending the upgrading of equipment or purchase of new equipment. We offer a minimum two year contract including benefits such as excellent compensation with overseas allowance, company paid housing and utilities, family relocation overseas, health and life insurance, and school through the 9th grade. Those who qualify as overseas residents are eligible for limited income exclusion under or Canadian citizenship required.
<b>Systems Analyst</b> <b>MANUFACTURING SYSTEMS</b> Analysis and development of plant and division staff operating and control procedures will be the initial responsibility of the person sought with 3 years experience in manufacturing systems analysis. Will guide and assist Battery Division operations in effective utilization of automatic systems. This new position is on the division financial staff at headquarters of Globe Union, a leading manufacturer of lead acid batteries. If you possess superior analytical skills and have knowledge of manufacturing operations, we welcome your inquiry. Please write or call: Mr. Robert Rendl (414) 228-2375 <b>GLOBE-UNION INC.</b> 5757 N. Green Bay Avenue Milwaukee, Wisconsin 53201 equal opportunity employer m/f		<b>PROJECT MANAGER</b> <b>GRAPHIC ARTS DEPT.</b> Manager needed for new electronic graphic art department in a large publishing and printing company. Degree in computer science with some graphic art knowledge is a plus. Responsibility will involve all phases from input of text and graphics to output from CRT typesetter. Full company paid benefits. Send resume and salary requirements to Personnel Department, P.O. Box 1103, Louisville, KY 40201. An Equal Opportunity Employer.	<b>EDP SALES</b> <b>FIELD SERVICE ENGRS SYSTEMS ENGINEER RAY HARRIS</b> Computers, Peripherals or Software experience. \$20-30,000+. Tired of no support, Low commissions & high charge backs? Contact Ray Harris for a career change!! <b>LLOYD PERSONNEL</b> 10 Cutter Mill Rd. Great Neck, N.Y. 11021 (516) 466-6670	<b>STAFF MANAGER</b> <b>Data Processing Services Planning</b> Saudi Arabian airlines offers excellent opportunity to an aggressive professional with a BS degree and at least 4 years of Data Processing experience. As Staff Manager, the selected candidate will interface with all departments and obtain information pertaining to future data services needs. Responsibilities will also include assisting in the justification and design of computer based systems that meet these needs reviewing future applications requirements; and recommending the upgrading of equipment or purchase of new equipment. We offer a minimum two year contract including benefits such as excellent compensation with overseas allowance, company paid housing and utilities, family relocation overseas, health and life insurance, and school through the 9th grade. Those who qualify as overseas residents are eligible for limited income exclusion under or Canadian citizenship required.
<b>PROJECT LEADER</b> Commodity News Services, Inc., is the largest U.S. wire service source of news concerning commodities. We are looking for a Project Leader to direct the development of an automated newsroom system. If you have: • Three years' experience as a project leader, minimum • Successful completion of at least one six-man year project, supervising 4 or more persons • Experience in TAL or ALGOL-like structured languages and desire a challenging career in a stimulating environment, please forward detailed resume, including salary history and requirements, in confidence, to: <b>Sally McKinney</b> Administrative and Personnel Manager <b>COMMODITY NEWS SERVICES, INC.</b> P.O. Box 6053 Leawood, Kansas 66206 We offer excellent benefits and attractive compensation package. Relocation expenses paid. An Equal Opportunity, Affirmative Action Employer, M/F		<b>Chicago Software Company</b> seeks: <b>1. INSTALLERS</b> For Micro based turn-key business system. <b>2. PROG/SYS ANALYST</b> Commercial experience in FORTRAN. D.G. background is a plus. Send resume to: <b>MBS</b> 2040 N. Janice Ave. Melrose Park, IL 60160	<b>PROGRAMMERS AND ANALYSTS</b> <b>Free Employment Service</b> <b>Northeast, Southeast &amp; Midwest U.S.</b> Scientific and commercial applications • Software development and systems programming • Telecommunications • Control systems • Computer engineering • Computer marketing and support Call or send resume or rough notes of objectives, salary, location restrictions, education and experience (including computers, models, operating systems and languages) to either one of our locations. Our client companies pay all of our fees. <b>RSVP SERVICES, Dept. C</b> Suite 700, One Cherry Hill Mall Cherry Hill, New Jersey 08002 (609) 667-4488 <b>RSVP SERVICES</b> Employment Agency for Computer Professionals	<b>STAFF MANAGER</b> <b>Data Processing Services Planning</b> Saudi Arabian airlines offers excellent opportunity to an aggressive professional with a BS degree and at least 4 years of Data Processing experience. As Staff Manager, the selected candidate will interface with all departments and obtain information pertaining to future data services needs. Responsibilities will also include assisting in the justification and design of computer based systems that meet these needs reviewing future applications requirements; and recommending the upgrading of equipment or purchase of new equipment. We offer a minimum two year contract including benefits such as excellent compensation with overseas allowance, company paid housing and utilities, family relocation overseas, health and life insurance, and school through the 9th grade. Those who qualify as overseas residents are eligible for limited income exclusion under or Canadian citizenship required.

position announcements	position announcements	position announcements	position announcements	position announcements
<b>TEXAS BAL</b> <b>\$20,000 to \$24,000</b> All relocation and interview fees paid. <i>Resumes to Jack Andrews</i> <b>ABACUS</b> PERSONNEL CONSULTANTS 2882 Forest Lane Dallas, Texas 75234 (214) 241-5145	<h1>SENIOR SOFTWARE ENGINEERS/DESIGNERS</h1> <p>ARE YOU A RESULTS ORIENTED TEAM PLAYER? A creative individual who can appreciate working closely with highly competent technical colleagues? Do you want the visibility and rewards that go with full utilization of your skills?</p> <p>Consider COMSHARE. We are looking for people who know they are better, are willing to prove their value, and can deal with success. We have the following senior level openings:</p> <p><b>COMMUNICATIONS/NETWORK DESIGNERS</b></p> <p>B.S., M.S. or equivalent and five years' experience in digital communications, computer networks, or large terminal systems. Minicomputer experience, especially PDP-11, preferred. These positions will involve specification, design, implementation and coordination at the senior engineer/project leader/supervisor level.</p> <p><b>SENIOR SYSTEMS DESIGNER</b></p> <p>B.S., M.S. or equivalent and five years' experience in operating system internals design and development. Timesharing and Transaction Processing systems experience preferred. Individuals lacking the specific requirements listed above, but who know they are good, are encouraged to apply.</p> <p>COMSHARE is a rapidly growing international computer services company headquartered in Ann Arbor, Michigan, Research Center of the Midwest. These positions command excellent salaries and benefits. And by the way, our people think we're a fun place to work.</p> <p><i>Please send your resume in confidence to: Al Fillion, Technical Staff, Research and Development, COMSHARE, INCORPORATED, P.O. Box 1588, Ann Arbor, Michigan 48106.</i></p> <p><b>COMSHARE</b>  <i>An Equal Opportunity Employer M/F</i></p>			<b>INTERNATIONAL TRAVEL \$30K+B</b> Major suburban NYC corp needs Int'l Systems Analysts (worldwide travel 40%). Review and upgrade systems & hardware. IBM SVs III to 370. Consumer products: order processing, inventory, sales & accounting applications. SPANISH language is required. For details in strict confidence call collect <b>DAVE TAIT</b> (914) 946-1227 <b>TRI-STATE STAFFING ASSOC.</b> 1 N. Broadway White Plains, N.Y. 10601 NO FEES AGENCY
<b>Management Consultant</b> Portland Office regional CPA firm MS department manager with strong EDP systems background and major CPA firm experience. Call collect (503) 238-0100 or send resume to 1200 Lloyd Building, Portland, OR 97232.	<b>PROGRAMMER/ANALYST</b> Mississippi State University Computing Center has a position for a programmer to maintain and update its computing center accounting application, serve as editor of computing center bulletins and provide programming support to systems programmers. Joint academic appointment possible, excellent fringe benefits and opportunities for advancement. Salary commensurate with experience. Send resume to: Dr. Wallace E. Killcreas, Div. of Numerical Services, Mississippi State University, P.O. Drawer CC, Mississippi State, MS 39762. Mississippi State University does not discriminate on the basis of race, color, religion, national origin, sex, age or handicap.			
<b>MORTGAGE SERVICING</b> PENNAMCO, INC., a nationwide real estate finance corporation has immediate openings for several experienced programmer analysts in its Washington D.C. regional office. Candidates should have a minimum of 3 years COBOL experience, working with a large mortgage servicing portfolio preferable IBM. OS with knowledge of JCL. As these positions include heavy user contact, candidates must be able to interface with all levels of management. Previous experience in a supervisory capacity is an asset. We offer a compensation program designed to reward performance, a competitive employee benefits package, and paid relocation expenses. Qualified applicants are invited to forward a resume and salary history to: Personnel Dept. <b>PENNAMCO, INC.</b> 1133 15th St. N.W. <i>equal opportunity employer m/f</i>	<b>SYSTEMS PROGRAMMER</b> Large insurance company located in southeast has opening for a qualified systems programmer. Applicant should have IMS DB/DC experience on S370/165-158-168 under OS/VS operating systems. Languages should include BAL or ALC, and COBOL, PL/I helpful. Experience with TSO, PANVALET. Salary depending on experience. If you are interested, send resume to Personnel Department, Providence Life and Accident Insurance Company, Fountain Square, Chattanooga, Tennessee 37402. <i>An Equal Opportunity Employer</i>	<b>HOUSTON</b> Prog Mgr Fortune 500 Co Urgent/ Mfg/Cobol to 23K Geophysicist/Hardware/ Software Open Prog/ALC/ applications to 25K Unlimited opportunities available in Systems & Programming Electronic Data Personnel Agency Inc. 175 One Shell Plaza Houston, Texas 77002 (713) 225-5359	<b>PROGRAMMERS</b> <p>If you are a programmer, programmer/analyst or systems analyst and would like the most individualized job search offered in the data processing field today, send your resume in confidence to:</p> <p><b>CINCINNATI</b>            SEARCH E.D.P., INC.            SUITE 25            3181 LINWOOD AVE.            CINCINNATI, OHIO 45208</p>	
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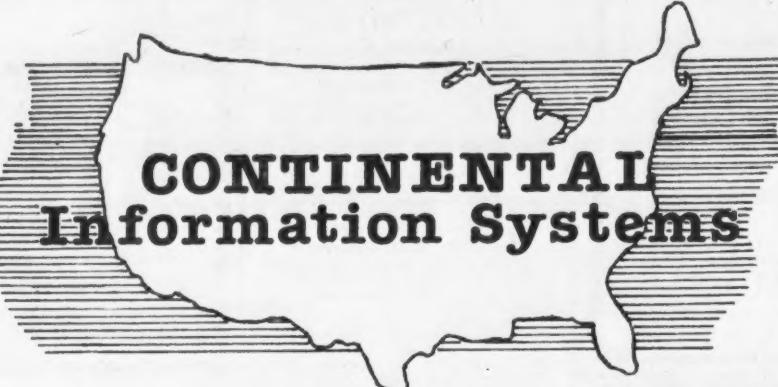
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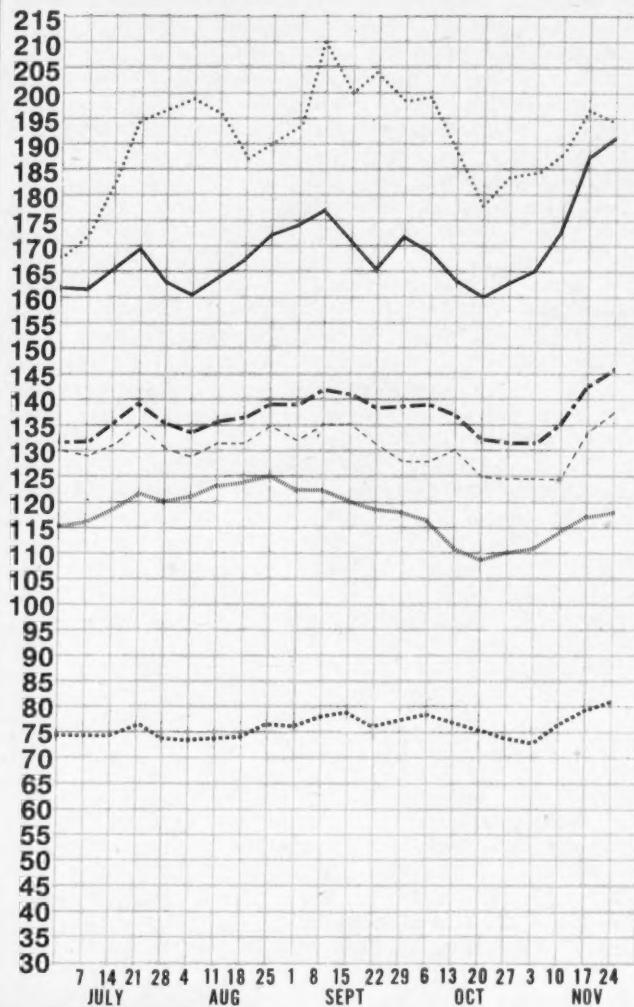
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## Earnings Reports

## COMPUSEV

Three Months Ended Sept. 9

	1977	1976
Shr Ernd	\$18	\$28
Revenue	3,095,000	2,828,000
Earnings	195,000	301,000
9 Mo Shr	.74	.70
Revenue	9,762,000	7,468,000
Earnings	837,000	741,000

## MCI Communications

Three Months Ended Sept. 30

	1977	a1976
Shr Ernd	\$05	....
Revenue	17,936,000	\$15,915,000
Tax Cred	541,000	....
Earnings	1,004,000	(251,000)
6 Mo Shr	.08	....
Revenue	35,609,000	28,684,000
Tax Cred	949,000	....
Spec Cred	....	2,015,000
Earnings	1,880,000	(1,532,000)

a-Reasted.

## MSI DATA

Three Months Ended Sept. 30

	1977	1976
Shr Ernd	\$45	\$34
Revenue	9,257,447	8,377,054
Earnings	904,813	672,299
6 Mo Shr	.85	.66
Revenue	18,315,186	17,020,232
Earnings	1,703,027	1,298,643

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## MODULAR COMPUTER SYSTEMS

Three Months Ended Sept. 30

	1977	a1976
Shr Ernd	\$31	....
Revenue	13,869,000	\$9,714,000
Disc Op	144,000	(246,000)
Earnings	1,066,000	(999,000)
9 Mo Shr	.60	....
Revenue	39,729,000	26,513,000
Disc Op Loss	26,000	598,000
Earnings	1,921,000	(4,976,000)

a-Reasted.

## NASHUA

Three Months Ended Sept. 30

	1977	1976
Shr Ernd	\$80	\$45
Revenue	102,566,000	91,589,000
Earnings	3,700,000	2,070,000
9 Mo Shr	2.30	1.30
Revenue	300,798,000	266,150,000
Earnings	10,650,00	6,020,000

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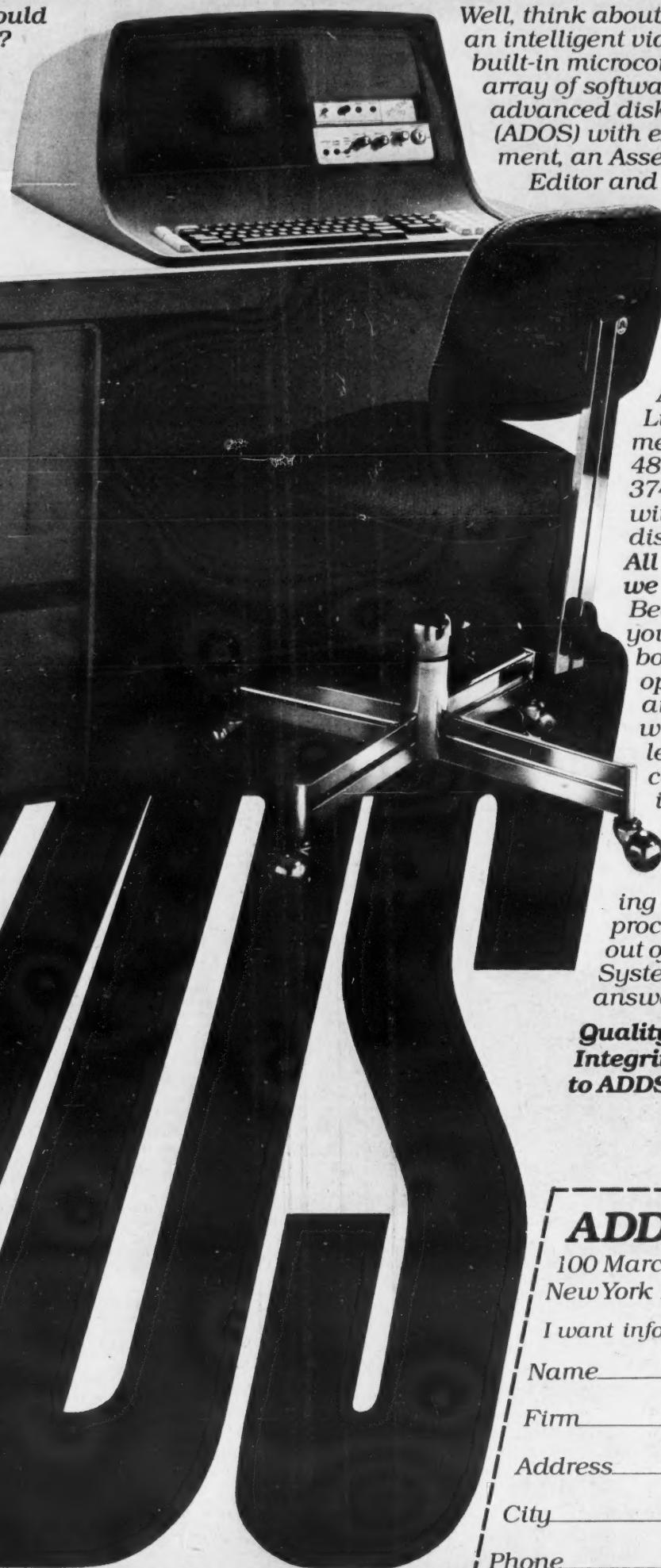
TRADE QUOTES.

EXCH	1977 RANGE	CLOSE NOV 22	WEEK NET	WEEK PCT	EXC H	1977 RANGE	CLOSE NOV 22	WEEK NET	WEEK PCT	EXC H	1977 RANGE	CLOSE NOV 22	WEEK NET	WEEK PCT
<b>COMPUTER SYSTEMS</b>														
O AMDAHL CORP	22- 44	43 3/4	+ 1 1/2	+3.5	O ADVANCED COMP TECH	0- 2	3/4	0	0.0	O DATA ACCESS SYSTEMS	4- 5	3	0	0.0
N BURROUGHS CORP	55- 91	70 7/8	+ 2	+2.9	O ANACOMP INC	7- 10	8 5/8	- 1/8	-1.4	O DATA PRODUCTS CORP	6- 10	9 1/8	+ 1/4	+2.8
D COMPUTER AUTOMATION	18- 30	27	+ 5/8	+2.3	A APPLIED DATA RES.	5- 10	8 1/8	+ 3/8	+4.8	D DATA TECHNOLOGY	9- 17	17 3/8	+ 1/4	+1.4
N CONTROL DATA CORP	20- 27	26 3/4	+ 1 3/4	+7.0	N AUTOMATIC DATA PROC	23- 30	28 3/8	- 1/8	-0.4	D DATUM INC	3- 4	4	-	-5.8
O CRAY RESEARCH INC	15- 29	25 1/2	+ 1/2	+2.0	O COLEMAN AMERICAN COS	2- 2	1 7/8	0	0.0	D DECISION DATA COMPUT	2- 3	2 1/8	+ 1/8	+6.2
N DATA GENERAL CORP	35- 52	52	+ 1/4	+0.4	O COMPU-SERV NETWORK	9- 15	12 3/4	+ 1/2	+6.0	D DELTA DATA SYSTEMS	1- 1	3/8	0	0.0
N DATAPoint CORP	18- 40	40	+ 3 3/8	+9.2	O COMP-ELECTION SYSTEMS	6- 10	9 1/8	- 3/8	-3.9	D DOCUMENTATION INC	6- 9	9	C	0.0
N DIGITAL EQUIPMENT	37- 53	49 1/2	+ 1 1/2	+3.1	O COMPUTER HORIZONS	1- 1	1 1/4	0	0.0	O DATARAN CORP	2- 15	15 1/4	+4 1/4	+38.6
N ELECTRONIC ASSOC.	2- 3	2 3/8	0	0.0	O COMPUTER NETWORK	6- 11	9 7/8	- 1/8	-1.2	O FABRI-TEK	1- 2	1	-	-11.1
A ELECTRONIC ENGINEER.	8- 12	11 1/4	- 3/8	-3.2	N COMPUTER SCIENCES	7- 9	8 7/8	+ 5/8	+7.5	O GENERAL COMPUTER SYS	0- 2	1 3/8	+ 1/4	+22.2
D FOUR-PHASE SYSTEMS	13- 20	20	+ 5/8	+3.2	O COMPUTER TASK GROUP	1- 2	1 7/8	0	0.0	O HAZELTINE CORP	8- 12	10 3/8	C	0.0
N FOXBORO	41- 54	44 5/8	+ 7/8	+2.0	O COMPUTER USAGE	1- 3	1 7/8	+ 1/4	+15.3	N HARRIS CORP	28- 44	41	- 3/4	-1.7
D GENERAL AUTOMATION	6- 9	6 3/4	- 1/4	-3.5	O COMSHARE	5- 8	8	+ 1/2	+6.6	O INCOTERM CORP	10- 19	18 5/8	- 1/4	-1.3
D GRI COMPUTER CORP	1- 1	3/4	0	0.0	O DATA DIMENSIONS INC	3- 5	3 3/4	- 1/8	-3.2	O INFORTE INC	4- 7	6 1/8	+ 7/8	+16.6
N HONEYWELL INC	43- 55	49 1/4	- 1/2	-1.0	O DATATAB	1- 2	1 1/4	+ 1/8	+11.1	O INFORMATION INTL INC	9- 14	9 3/4	+ 1/2	+5.4
N IBM	245- 286	266 1/4	+ 8 3/8	+3.2	O INSYTE CORP	2- 3	1 3/8	0	0.0	O INTEL CORP	38- 57	46	0	0.0
D MANAGEMENT ASSIST	5- 9	8 7/8	+ 1/4	+2.8	O IPS COMPUTER MARKET.	1- 2	2 1/2	+ 1/4	+12.5	O LUNDY ELECTRONICS	3- 6	3 7/8	0	0.0
D MICRODATA CORP	7- 18	11 1/2	C	0.0	O KEANE ASSOCIATES	3- 4	4	+ 1/8	+3.2	O MSI DATA CORP	6- 13	13 1/4	-	-0.9
D MODULAR COMPUTER SYS	5- 9	9 3/8	+ 1/4	+2.7	O KEYDATA CORP	1- 3	1 3/8	0	0.0	O MEMOREX	23- 34	30 3/4	+ 1	+3.3</td

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